Avaya MultiVantage® Application Enablement Services

TR/87 Implementation Guide

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Chapter 1: Overview of the AE Services TR/87 Implementation

About this document

In terms of planning, this document is intended for anyone who is involved with integrating Application Enablement Services (AE Services) with Microsoft Office Live Communications Server. In terms of implementation, it is directed toward administrators from the Microsoft Office Live Communications Server and the AE Services administrative domains. As a high-level planning and implementation guide, this document serves as a road map for using the Microsoft Live Communications Server documents and the AE Services documents.

Reason for reissue

The AE Services TR/87 Implementation Guide, Issue 1.1, includes an update to the requirements for AE Services and Live Communications Server integration. Issue 1.1 of the document includes the Microsoft Office 2005 Address Book Service as a requirement.

About TR/87

TR/87 refers to ECMA Technical Report TR/87, "Using CSTA for SIP Phone User Agents (uaCSTA)." The TR/87 standard specifies how to send CSTA 3 XML messages over a SIP transport. TR/87 is the method that Microsoft Live Communications Server uses to integrate with Telephony systems to accomplish control of desktop phones. (SIP stands for Session Initiation Protocol).

For AE Services Release 4.0, the AE Services Server (AE Server) has been enhanced to include support for the TR/87 protocol.

Note:

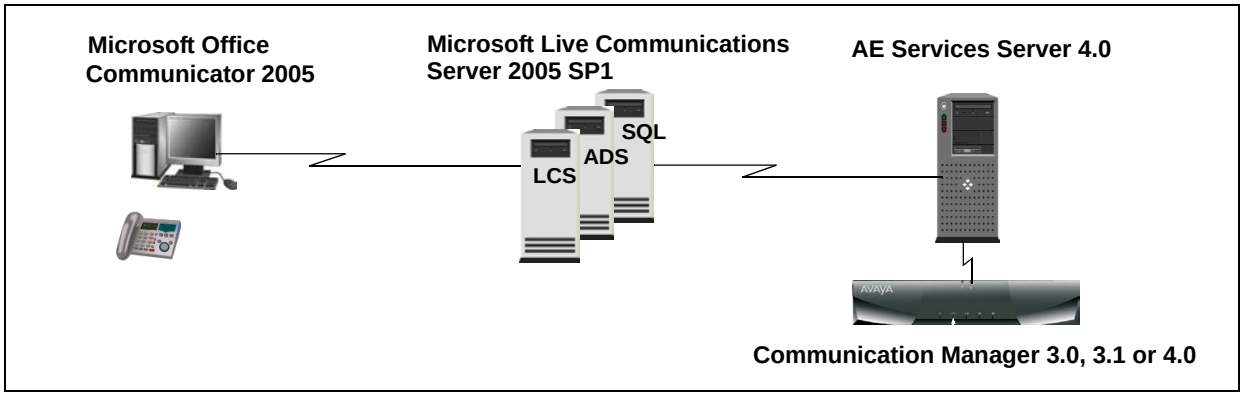
Although TR/87 is a SIP-based protocol, AE Services and Communication Manager do not currently support control of SIP endpoints using Microsoft Office Communicator.

Overview of the AE Services TR/87 Implementation

The AE Services TR/87 Implementation provides a solution for controlling your Avaya telephone or IP softphone using Microsoft Office Communicator. The AE Services TR/87 Implementation enables users to operate more efficiently by launching and answering phone calls from the Microsoft Office Communicator application. As a result, people, teams, and organizations are able to communicate simply and effectively while working with Avaya and Microsoft applications. The terms "AE Services TR/87 Implementation" and "AE Services and Microsoft Live Communications Server integration" are synonymous.

Figure 1 provides a high level view of the components in an AE Services TR/87 configuration.

Figure 1: High level view of the AE Services TR/87 components



Requirements for AE Services and Live Communications Server integration

The the requirements for integration are as follows:

Live Communications Server Enterprise Edition with SP1 or Live Communications Server Standard Edition with SP1: Live Communications Server Enterprise Edition with SP1 is designed for installations with up to 125,000 users. Live Communications Server Standard Edition with SP1 is designed for installations with up to 20,000 users.

- All required servers must be joined to the domain and able to resolve each other's fully qualified domain names (FQDN). Microsoft Office Communicator clients must be able to communicate with each other.
- Microsoft Office Live Communications Server 2005 Address Book Service must be configured and deployed for an AE Services and Live Communications Server integration. The Address Book Service provides Microsoft Office Communicator users with a local cache of the global address list. This enables Communicator users to quickly search the global list using the Find feature. Optionally, you can set up Address Book to provide phone number normalization. For more information see, Set up Address Book Service on page 15.

Note:

AE Services supports a connection to only one Live Communications Server, either Live Communications Server 2005 Standard Edition Server or one Live Communications Server 2005 Enterprise Pool. For an illustration of sample configurations, see Figure 3: Configuring AE Services with 5,000 or more concurrent users on page 11).

A certificate authority (CA): The CA can be either Microsoft Certificate Services or a third party CA.The Live Communications Server must trust the Certificate Authority and have its own certificate installed.

Avaya Communication Manager 3.0, or later: Communication Manager 3.1 is strongly recommended because it includes the Link Bounce Resiliency feature. Communication Manager 4.0 is required for any installation with more than 21,000 concurrent Microsoft Office Communicator 2005 (Communicator 2005) users.

AE Services Server 4.0: The AE Services Server must be set up as a dedicated server for the TR/87 Implementation. That is, the AE Server must be dedicated to the AE Services and Live Communications Server integration. AE Services does not support an AE Server configured with AE Services TR/87 and another application, such as a TSAPI, JTAPI, DLG, CVLAN, or Device, Media, and Call Control application.

A single AE Server can to support up to 16 Communication Manager servers (switches) for an AE Services TR/87 implementation (see Figure 2: Maximum number of Communication Manager servers supported by AE Services on page 10).

An AE Services administrative workstation: The AE Services Bundled Server does not provide a Web browser, and the AE Services Software Only solution does not assume that you will install one. To administer AE Services, you need an administrative workstation -- a computer running a browser with network access to the AE Server.

Unified Desktop License: When you install AE Services and activate the "Unified CC API - Desktop Edition" license, the AE Server is TR/87-enabled. You do not have to install any special software.

Note:

The certificates distributed by the AE Services license file do not work in the Live Communications Server environment, and the AE Services administrator must configure certificates. For more information, see Administering Certificates -- certificate management on page 24.

Figure 2: Maximum number of Communication Manager servers supported by AE Services

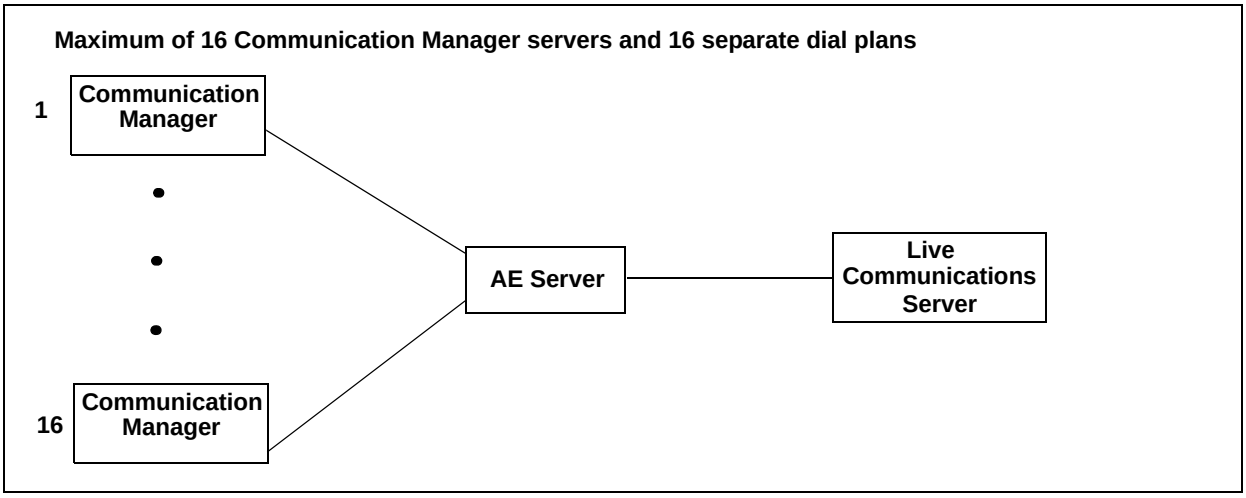
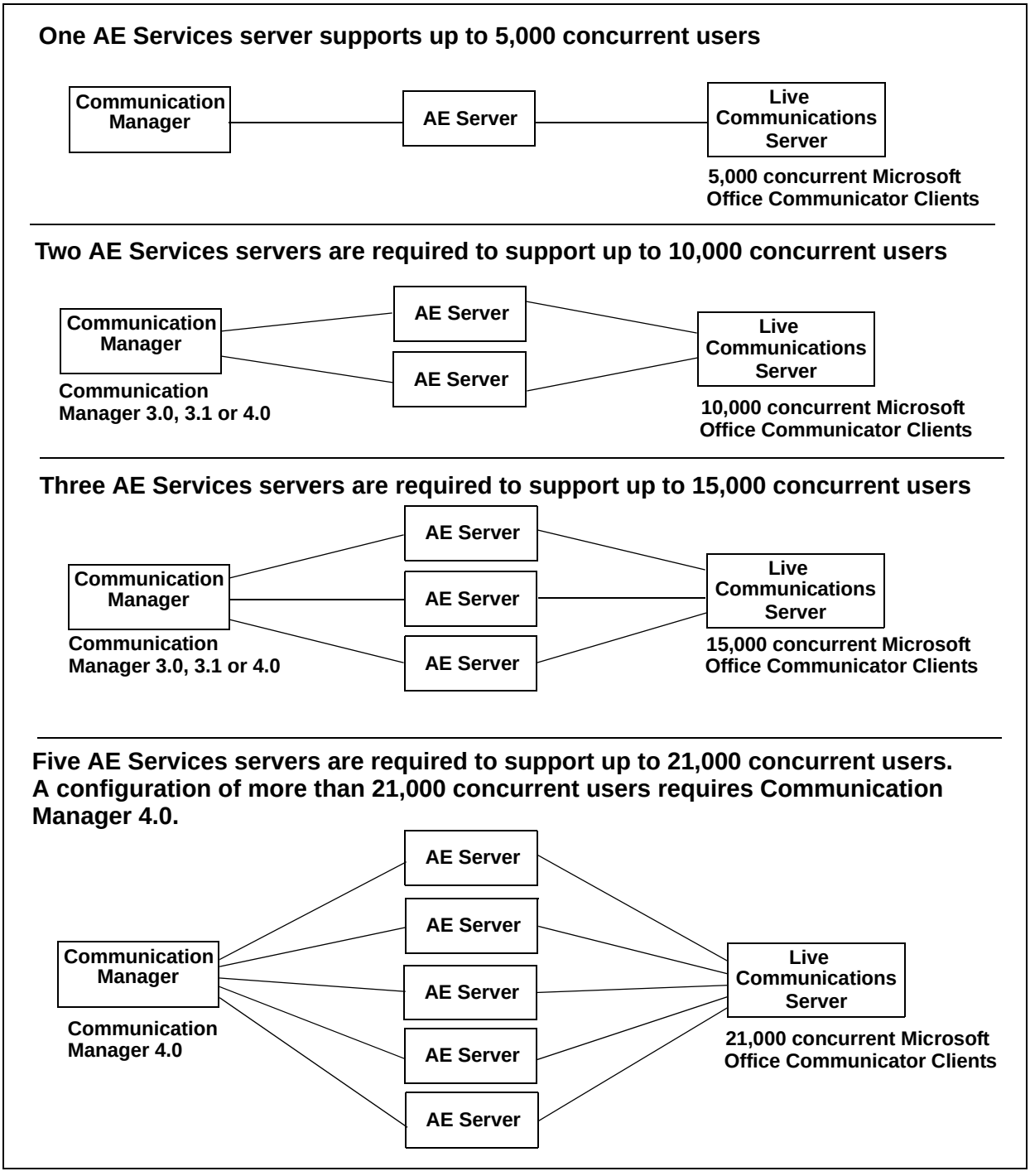


Figure 3: Configuring AE Services with 5,000 or more concurrent users

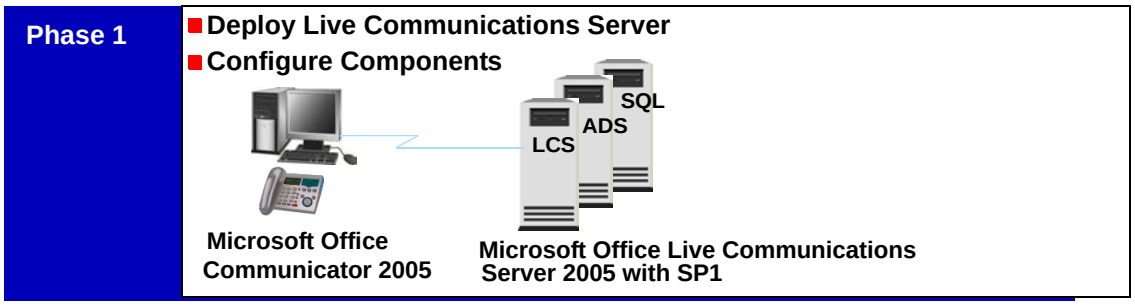

One AE Services server supports up to 5,000 concurrent users
Communication Manager
AE Server
Live Communications Server
5,000 concurrent Microsoft Office Communicator Clients
Two AE Services servers are required to support up to 10,000 concurrent users
Communication Manager
AE Server
AE Server
Live Communications Server
Communication Manager 3.0, 3.1 or 4.0
10,000 concurrent Microsoft Office Communicator Clients
Three AE Services servers are required to support up to 15,000 concurrent users
Communication Manager
AE Server
AE Server
AE Server
Live Communications Server
Communication Manager 3.0, 3.1 or 4.0
15,000 concurrent Microsoft Office Communicator Clients
Five AE Services servers are required to support up to 21,000 concurrent users. A configuration of more than 21,000 concurrent users requires Communication Manager 4.0.
Communication Manager
AE Server
AE Server
AE Server
AE Server
AE Server
Live Communications Server
Communication Manager 4.0
21,000 concurrent Microsoft Office Communicator Clients

The road map for integrating AE Services and Live Communications Server

This section maps the integration activities to the documentation.

Phase 1 -- Setting up the Live Communications Server environment

For a checklist of activities associated with Phase 1, see Phase 1 checklist -- Live Communications Server on page 13. Note that Phase 1 and Phase 2 activities can be carried out concurrently.



Microsoft documents for Phase 1

This document assumes that you are implementing AE Services in an existing Live Communications Server 2005 with SP1 configuration. The following list is not the complete list of Microsoft Live Communications Server documents, but it includes documents that are strongly recommended for integrating AE Services with Live Communications Server. The Quick Start documents are particularly useful for integrating AE Services in a Live Communications Server environment.

- *Live Communications Server 2005 Enterprise Edition Lab Quick Start*
- *Live Communications Server 2005 with SP1 Standard Edition Lab Quick Start*
- *Microsoft Office Live Communications Server 2005 with SP1 Active Directory Preparation*
- *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*
- *Microsoft Office Live Communications Server 2005 Address Book Service Planning and Deployment Guide*
- *Microsoft Office Live Communications Server 2005 Certificate Configuration*

You can download these documents from the Microsoft Download Center at:

http://www.microsoft.com/downloads

Phase 1 checklist -- Live Communications Server

This checklist refers to activities described in Phase 1 -- Setting up the Live Communications Server environment on page 12.

The information in Table 1 is based on "Telephony Requirements" in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*. Table 1 applies to either of the following configurations.

- Live Communications Server 2005 Standard Edition (up to 20,000 users)
- Live Communications Server 2005 Enterprise Edition (up to 125,000 users), sometimes referred to as an Enterprise Pool

These tasks can be performed at the same time as the tasks described Phase 2 -- Setting up AE Services and Communication Manager on page 16, but they must be completed before the tasks described in Chapter 2: Integrating AE Services with Live Communications Server.

Table 1: Checklist for Live Communications Server

	Task	Document
1	**Active Directory is set up**	
	• Domain controllers with Microsoft Windows 2000 SP4 or Microsoft Windows 2003. • Global catalog servers with Windows 2000 SP4 or Windows Server 2003. For more information about Global catalog servers, see "Infrastructure Requirements," in *Live Communications Server 2005 with SP1 Active Directory Preparation*.	• *Microsoft Office Live Communications Server 2005 with SP1 Standard Edition Deployment Guide* • *Microsoft Office Live Communications Server 2005 with SP1 Enterprise Edition Deployment Guide*
2	**Active Directory preparation is completed**	
	Carry out the Active Directory Preparation basic steps: • Prep Schema • Prep Forest • Prep Domain • DomainAdd to the Forest Root	• *Microsoft Office Live Communications Server 2005 with SP1 Active Directory Preparation*. See "Running Active Directory Preparation Basic Steps: Prep Schema, Prep Forest, Prep Domain and DomainAdd to The Forest Root."
		1 of 3

Table 1: Checklist for Live Communications Server (continued)

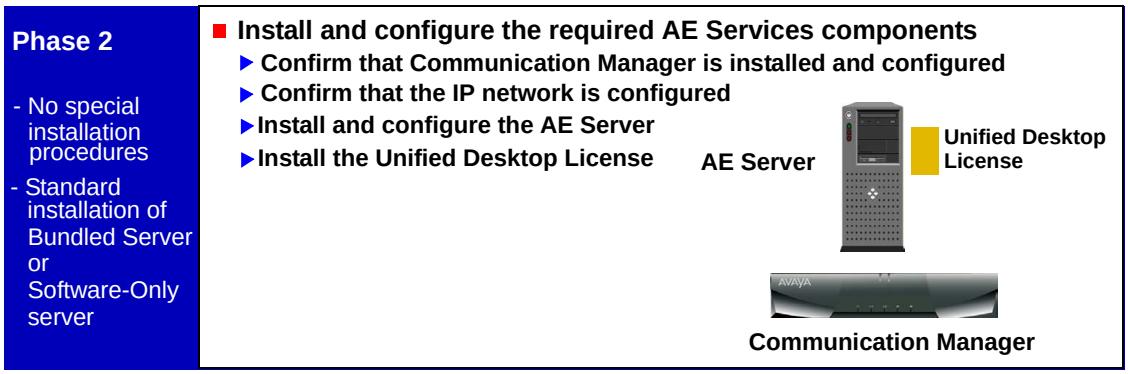
	Task	Document
3	**Public Key Infrastructure (PKI) is set up**	
	Set up a Public Key Infrastructure (PKI).	• For more information, see *Microsoft Office Live Communications Server 2005 Certificate Configuration.* • See also, *Live Communications Server 2005 with SP1 Security Guide*.
4	**Certificates have been configured**	
	For the AE Services TR/87 integration, you must configure the Live Communications Server 2005 (Enterprise or Standard Edition) server to use Mutual TLS (Transport Layer Security) and then configure a certificate.	• See *Microsoft Office Live Communications Server 2005 Certificate Configuration*, "Configuring Certificates on Live Communications Servers." • See also, Administering Certificates -- certificate management on page 24.
5	**Domain Name System (DNS) is set up and deployed**	
	Set up server.	See "Configuring DNS, Client Access and User Settings" in either of these documents: • *Microsoft Office Live Communications Server 2005 with SP1 Standard Edition Deployment Guide* • *Microsoft Office Live Communications Server 2005 with SP1 Enterprise Edition Deployment Guide*
6	**Live Communications Server (either Standard or Enterprise) is deployed**	
	• Deploy Standard Edition. or • Deploy Enterprise Edition.	• See "Deploying Live Communications Server 2005 Standard Edition" in the *Microsoft Office Live Communications Server 2005 with SP1 Standard Edition Deployment Guide.* • See "Deploying Live Communications Server 2005 Enterprise Edition" in the *Microsoft Office Live Communications Server 2005 with SP1 Enterprise Edition Deployment Guide.*
		2 of 3

Table 1: Checklist for Live Communications Server (continued)

	Task	Document
7	**Servers are configured**	
	Configure either the Standard Edition Server or the Enterprise Edition Server.	• See "Configuring the Standard Edition Server" in the *Microsoft Office Live Communications Server 2005 with SP1 Standard Edition Deployment Guide.* • See "Configuring the Enterprise Edition Server" in the *Microsoft Office Live Communications Server 2005 with SP1 Enterprise Edition Deployment Guide.*
8	**DNS is configured**	
	Configure DNS.	• See "Configuring DNS, Client Access and User Settings" in the *Microsoft Office Live Communications Server 2005 with SP1 Standard Edition Deployment Guide.* • See "Configuring DNS, Client Access and User Settings" in the *Microsoft Office Live Communications Server 2005 with SP1 Enterprise Edition Deployment Guide.*
9	**Set up Address Book Service** • **Address Book Service is required for AE Services Live Communications Server integration.**	
	The main function of the Address Book Service is to provide Microsoft Office Communicator with a local cache of the global address list. AE Services requires that you configure Live Communications Server with the Address Book service so that Communicator users can take advantage of this capability. Optionally, you can set up the Address Book Service to perform phone number normalization. **Note:** If you configure the Address Book Service to normalize phone numbers, bear in mind that it does not support multinational deployments of Live Communications Server. Only one set of normalization rules can be configured per Live Communications server. If that server is supporting multiple countries, you can do the normalization rules for only one of those countries.	• See *Microsoft Office Live Communications Server 2005 Address Book Service Planning and Deployment Guide.*
		3 of 3

Phase 2 -- Setting up AE Services and Communication Manager

For the checklist of activities associated with Phase 2, see Phase 2 checklists -- setting up AE Services and Communication Manager on page 16.


Phase 2
- No special installation procedures
- Standard installation of Bundled Server or Software-Only server
Install and configure the required AE Services components
Confirm that Communication Manager is installed and configured
Confirm that the IP network is configured
Install and configure the AE Server
Install the Unified Desktop License
AE Server
Unified Desktop License
Communication Manager

AE Services documents for Phase 2

To install the AE Services software and bring the AE Server to an operational state, use either the Bundled Server or the Software Only installation guide, based on the offer you are using. Use the Administration Guide and OAM Help for administering Communication Manager.

- *Avaya MultiVantage Application Enablement Services Installation and Upgrade Guide for a Bundled Server*, 02-300356
- *Avaya MultiVantage Application Enablement Services Installation Guide Software-Only Offer*, 02-300355
- *Avaya MultiVantage Application Enablement Services Administration and Maintenance Guide*, 02-300357
- Application Enablement Services Operations, Administration, and Maintenance (OAM) Help (which is included with the AE Services server software)

AE Services documents are available from the Web in Portable Document Format (.pdf) at the Avaya Support Web Site (http://www.avaya.com/support).

Phase 2 checklists -- setting up AE Services and Communication Manager

Use the checklists in this section for either a Bundled Server installation or a Software-Only server installation. The tasks in each of these checklists must be completed before you start the procedures described in Chapter 2: Integrating AE Services with Live Communications Server.

- Table 2 summarizes the tasks that are required for carrying out an AE Services Bundled Server installation.
- Table 3 summarizes the tasks that are required for carrying out an AE Services Software-Only server installation.

Bundled Server installation checklist

Avaya Technical Services is responsible for installing and maintaining components in a Bundled Server configuration. The following abbreviations are used in the Table 2: FE (Field Engineer) and CSI (Communication Solutions and Integration, as in CSI technician).

Table 2: Bundled server installation checklist

	Task	Role	Document
1	Verify that the installation site meets the prerequisites.	FE	See Chapter 1 of the *Avaya MultiVantage Application Enablement Services Installation and Upgrade Guide for a Bundled Server,* 02-300356 (Bundled Server Installation Guide).
2	Install and configure the hardware.	FE	See Chapter 2 of the Bundled Server Installation Guide.
3	Install the software.	FE	See Chapter 3 of the Bundled Server Installation Guide.
4	Install the AE Services license.	FE	See Chapter 4 of the Bundled Server Installation Guide. **Note:** For AE Services TR/87, install the "Unified CC API - Desktop Edition" license.
5	Verify Communication Manager requirements.	CSI/FE	See Chapter 1 of the *Avaya MultiVantage Application Enablement Services Administration and Maintenance Guide*, 02-300357 (AE Services Administration and Maintenance Guide).
6	Verify TN799DP CLAN board installation and administration on CM.	CSI/FE	See "Adding CLANs to the network" in Chapter 1 of the AE Services Administration and Maintenance Guide.
7	Enable AE Services on Communication Manager.	CSI	See "Enabling AE Services" in Chapter 1 of the AE Services Administration and Maintenance Guide.
8	Administer a CTI link (ADJ-IP).	CSI	See "Administering a CTI Link for TSAPI, JTAPI, Telephony Web Service, and Device, Media, and Call Control " in Chapter 1 of the AE Services Administration and Maintenance Guide.
9	Check the status of the switch connection (from Communication Manger to AE Services).	CSI	See "Checking the status of a Switch Connection -- from Communication Manager" in Chapter 1 of the AE Services Administration and Maintenance Guide.

Software-Only server installation checklist

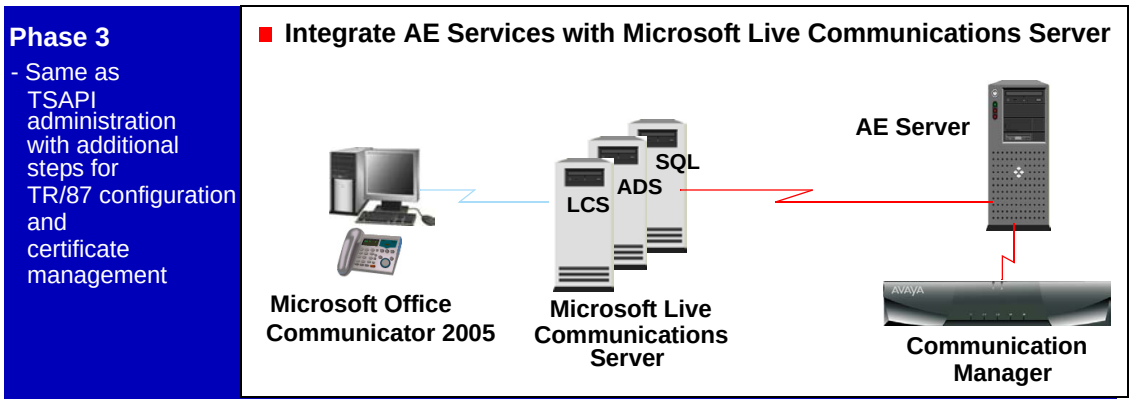
The customer or an Information Technology (IT) Technician is responsible for installing and maintaining components in an AE Services Software-Only server configuration.

Table 3: Software-only server installation checklist

	Task	Admin domain	Document
1	Determine that you have met the prerequisites for AE Services.	AE Services	See Chapter 1 of the *Avaya MultiVantage Application Enablement Services Installation and Upgrade Guide, Software-Only Offer,* 02-300355 (Software-Only Installation Guide).
2	Install the Linux platform software.	AE Services	See Chapter 2 of the Software-Only Installation Guide.
3	Install the software	AE Services	See Chapter 3 of the Software-Only Installation Guide.
4	Install the AE Services license	AE Services	See Chapter 4 of the Software-Only Installation Guide. **Note:** For AE Services TR/87, install the "Unified CC API - Desktop Edition" license.
5	Verify Communication Manager requirements	Communication Manager	See Chapter 1 of the *Avaya MultiVantage Application Enablement Services Administration and Maintenance Guide*, 02-300357 (AE Services Administration and Maintenance Guide).
6	Verify TN799DP CLAN board installation and administration on Communication Manager	Communication Manager	See "Adding CLANs to the network" in Chapter 1 of the AE Services Administration and Maintenance Guide
7	Enable AE Services on Communication Manager	Communication Manager	See "Enabling AE Services" in Chapter 1 of the AE Services Administration and Maintenance Guide.
8	Administer a CTI link (ADJ-IP)	Communication Manager	See "Administering a CTI Link for TSAPI, JTAPI, Telephony Web Service, and Device, Media, and Call Control " in Chapter 1 of the AE Services Administration and Maintenance Guide.
9	Check the status of the switch connection (from Communication Manger to AE Services)	Communication Manager	See "Checking the status of a Switch Connection -- from Communication Manager" in Chapter 1 of the AE Services Administration and Maintenance Guide.

Phase 3 -- Integrating AE Services with Live Communications Server

Phase 3 is presented separately in Chapter 2: Integrating AE Services with Live Communications Server. Chapter 2 describes the administrative procedures for AE Services and Live Communications Server that are necessary for a successful integration.



Microsoft Office Live Communications Server documents for Phase 3

- *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*
- *Microsoft Office Live Communications Server 2005 Certificate Configuration*

AE Services documents for Phase 3

- *Avaya MultiVantage Application Enablement Services TR/87 Implementation Guide,* 02-601893
- *Avaya MultiVantage Application Enablement Services Administration and Maintenance Guide*, 02-300357
- Application Enablement Services Operations, Administration, and Maintenance (OAM) Help (included with the AE Services server software)

Chapter 2: Integrating AE Services with Live Communications Server

How to use the information in this chapter

After you complete the tasks in Chapter 1, use the information in this chapter to integrate Application Enablement Services (AE Services) with Microsoft Live Communications Server.

Phase 3 Checklist --integrating AE Services with Live Communications Server

Use Table 4 as a checklist for performing the tasks necessary for integrating AE Services in a Microsoft Live Communications Server environment.

Table 4: Checklist for integrating AE Services with Live Communications Server

Task		Admin domain	Document
1	Administer a switch connection from AE Services to Communication Manager.	AE Services	See "Administering the Local IP for all AE Services" Chapter 2 of the AE Services Administration and Maintenance Guide.
2	Check the status of the switch connection (from AE Services to Communication Manager).	AE Services	See "Checking the status of a switch connection -- from the AE Server" Chapter 2 of the AE Services Administration and Maintenance Guide.
3	Administer a TSAPI Link.	AE Services	See "Administering TSAPI Links in AE Services OAM" Chapter 2 of the AE Services Administration and Maintenance Guide.
4	Enable the TR/87 Port in OAM.	AE Services	TR/87 Implementation Guide, see Enabling the TR/87 port on page 23.
			1 of 2

Table 4: Checklist for integrating AE Services with Live Communications Server (continued)

Task		Admin domain	Document
5	Administer certificates for AE Services and Microsoft Live Communications Server.	Microsoft Live Communications Server	See Procedure 1 - Installing the trusted certificate on Live Communications Server on page 25.
		Microsoft Live Communications Server	See Procedure 2 - Installing a server certificate for the Live Communications Server on page 29 of this document.
		AE Services	See Procedure 3 - Installing the trusted certificate on the AE Server on page 33 of this document.
		AE Services	See Procedure 4 - Creating a server certificate request for AE Services on page 39 of this document.
		AE Services	See Procedure 5 - Creating a server certificate for AE Services on page 40 of this document.
		AE Services	See Procedure 6 - Importing the server certificate into AE Services OAM on page 42 of this document.
6	Administer settings for the dial plan.	AE Services	See Dial Plan settings in AE Services OAM on page 44 of this document.
7	Administer settings for Active Directory.	AE Services	See Administering Active Directory on page 52 of this document.
8	Configure the Microsoft Office Communicator 2005 Client.	Microsoft -- either the client workstation or the Active Directory Server	See "Configuring the Client" in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*.
9	Set up a static route.	Microsoft Live Communications Server	TR/87 Implementation Guide, See Configuring a static route on page 57.
10	Specify the AE Server as an authorized host.	Microsoft Live Communications Server	TR/87 Implementation Guide, see Specifying the AE Server as an authorized host on page 58.
11	Set up Remote Call Control for each user in Active Directory Services.	Microsoft Active Directory Server	TR/87 Implementation Guide, see Enabling Remote Call Control in Active Directory on page 56. Based on information from *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide.*
			2 of 2

About configuring AE Services for Live Communications Server

In terms of the AE Services Operations, Administration and Maintenance (OAM) interface, configuring AE Services for Live Communications Server is an extension of TSAPI-based administration.

To configure AE Services for Live Communications Server, you must carry out the TSAPI-related administration tasks as well as the TR/87 administration tasks.

- **TSAPI related administration tasks**, which are described in Chapter 2 of the *Avaya MultiVantage Application Enablement Services Administration and Maintenance Guide*, 02-300357:
  - administering a local IP
  - administering a switch connection
  - administering a TSAPI link
- **TR/87 administration tasks**, which are described in this document:
  - enabling the TR/87 port - see Enabling the TR/87 port on page 23
  - administering certificates - see Administering Certificates -- certificate management on page 24
  - administering the dial plan settings - see Dial Plan settings in AE Services OAM on page 44
  - administering settings for Active Directory - see Administering Active Directory on page 52

Enabling the TR/87 port

AE Services uses port 4723 for communications between AE Services and Microsoft Live Communications Server. Because this port is disabled by default in AE Services OAM, you must log into OAM and enable it.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Administration** > **Network Configuration** > **Ports**.
3. On the Ports page, under DMCC Server Ports, locate the TR/87 Port, and select the option button for Enabled.

Administering Certificates -- certificate management

AE Services and Microsoft Live Communication Server communicate using Transport Layer Security (TLS). For communication to take place, AE Services and Microsoft Live Communications Server must exchange signed server certificates each time a TLS session is opened. This section provides a sample certificate management scenario that includes the following procedures.

- Procedure 1 - Installing the trusted certificate on Live Communications Server on page 25
- Procedure 2 - Installing a server certificate for the Live Communications Server on page 29
- Procedure 3 - Installing the trusted certificate on the AE Server on page 33
- Procedure 4 - Creating a server certificate request for AE Services on page 39
- Procedure 5 - Creating a server certificate for AE Services on page 40
- Procedure 6 - Importing the server certificate into AE Services OAM on page 42

Additional references

The following documents are useful for understanding the tasks that are required for a service integration.

- *Live Communications Server 2005 Enterprise Edition Lab Quick Start* or
- *Live Communications Server 2005 with SP1 Standard Edition Lab Quick Start*

About the sample scenario

The procedures in the sample scenario are based on using Microsoft Live Communications Server 2005 Enterprise Edition along with a Microsoft Windows Server 2003 Standalone Certificate Authority. Use the sample scenario to familiarize yourself with the basic tasks for integrating AE Services with Microsoft Live Communications Server.

Because some users will rely on a certificate authority (CA) other than Microsoft Certificate Services, the CA-based procedures include generic instructions as well as Microsoft-based instructions.

Client and server authentication

The AE Services TR/87 Implementation requires a certificate that does both client authentication and server authentication.

In terms of the Microsoft Windows Server 2003 Standalone CA, this means that when you complete the Advanced Certificate Request, you will select **Other...** from the "Type of Certificate Needed" drop-down list. When you select **Other...** the Advanced Certificate Request displays a text entry field for the OID (object identifier). For information about completing this field, see Installing a Microsoft Certificate Services-based certificate on the Live Communications Server on page 30.

If you use another CA (either a generic CA or the Microsoft Windows Server 2003 Enterprise CA), the certificate request will not contain the same drop-down menus and choices. For example with Microsoft Windows Server 2003 Enterprise CA, you might not see a field for the OIDs because the OIDs can be set by the CA administrator in a template.

Procedure 1 - Installing the trusted certificate on Live Communications Server

The trusted certificate is also referred to as the CA Certificate. From the Microsoft Live Communications Server, follow the appropriate procedure to obtain the trusted certificate and import it into the Microsoft Live Communications Server certificate store.

When installing the trusted certificate, note that Live Communications Server and AE Services must use either the same CA or an issuer in the same certificate chain.

- If you are using a third party certificate authority other than Microsoft Certificate Services, follow the procedure described in Installing the trusted certificate from another vendor.
- If you are using Microsoft Certificate Services, follow the procedure described in Installing the trusted certificate generated by Microsoft Certificate Services.

Installing the trusted certificate from another vendor

Steps 1 and 2 are provided as a general reference only -- follow the instructions on your CA's Web site.

1. From your browser, go your certificate authority's Web page for requesting a trusted certificate or a trusted certificate chain.
2. Import the trusted certificate. For information about importing certificates and using the certreq utility, see "Using a Public Certificate," in *Microsoft Office Live Communications Server 2005 Certificate Configuration*.
3. Continue with Importing the certificate into the Live Communications Server's trust store on page 27.

Installing the trusted certificate generated by Microsoft Certificate Services

Follow this procedure to download the trusted certificate generated by Microsoft Certificate Services.

1. From your browser, type the URL of the Microsoft Certificate Services Server. For example:

   http://<*certificate_server.*com>/certsrv

2. From the Microsoft Certificate Services page, click **Download a CA certificate, certificate chain, or CRL**.
3. Complete the Download a CA Certificate, Certificate Chain, or CRL page as follows:
   a. Under CA Certificate, in the list box, select the signing certificate.
   b. Click **Base 64**.
   c. Click **Download CA certificate chain**.
4. Save the CA certificate file (**lcscertnew.p7b**, for example) to a local directory on the Microsoft Live Communications Server (C:\temp, for example).
5. Continue with the steps described next in Importing the certificate into the Live Communications Server's trust store.

Importing the certificate into the Live Communications Server's trust store

Use this procedure to import the trusted certificate, from any CA, in to the Live Communications Server's trust store.

1. Start the Microsoft Management console -- Click **Start**, and then click **Run**. In the Run dialog box, type **mmc**, and click **OK**.
2. From the Console window, click **File** > **Add/Remove Snap-in...**.
3. From the Add/Remove Snap-in dialog box, on the Standalone tab, which displays **Console Root** as the default, click **Add...**.
4. From the Add Standalone Snap-in dialog box, select **Certificates**, and click **Add**.
5. From the Certificates snap-in dialog box, select **Computer account**, and click **Next**.
6. From the Select Computer dialog box, select **Local Computer: (the computer this console is running on)**, and click **Finish**.
7. Click **Close** from the Add Standalone Snap-in dialog box, and then click **OK** from the Add/ Remove Snap-in dialog box.
8. From the left pane of the Console Root, under Certificates (Local Computer), expand **Trusted Root Certificates Authorities**.
9. Right-click **Certificates**, and then select **All Tasks** and click **Import**.
10. From the Certificate Import Wizard, Welcome screen, select **Next**.
11. Click **Browse**, and go to the directory where you stored the certificate file (**C:\temp\ lcscertnew.p7b**, for example). Select the certificate file (**lcscertnew.p7b**, for example) and click **Open.**
12. In the Certificate Import Wizard, Certificate Store dialog box, make sure that **Place all certificates in the following store** is selected, and the Certificate Store is: **Trusted Root Certification Authorities**. Click **Next**.
13. When the Certificate Import Wizard dialog box displays the message "You have successfully completed the Certificate Import wizard," click **Finish**.

Procedure 1a - Verifying the installation of the trusted certificate on Live Communications Server

Follow this procedure to verify that the trusted certificate is installed correctly.

1. Start the Microsoft Management console -- Click **Start**, and then click **Run**. In the Run dialog box, type **mmc**, and click **OK**.
2. From the Console window, click **File** > **Add/Remove Snap-in...**.
3. From the Add/Remove Snap-in dialog box, on the Standalone tab, which displays **Console Root** as the default, click **Add...**.
4. From the Add Standalone Snap-in dialog box, select **Certificates**, and click **Add**.
5. From the Certificates snap-in dialog box, select **Computer account**, and click **Next**.
6. From the Select Computer dialog box, select **Local Computer: (the computer this console is running on)**, and click **Finish**.
7. Click **Close** from the Add Standalone Snap-in dialog box, and then click **OK** from the Add/Remove Snap-in dialog box.
8. Verify that the trusted certificate for the Live Communications Server is installed, as follows:
   a. In the left pane of the console, Under Certificates (Local Computer) expand **Trusted Root Certificates Authorities** and click **Certificate**. The console displays a list of trusted certificates in the right pane.
   b. In the right pane of the console, verify that the display includes the trusted certificate that you installed at the end of Procedure 1, as follows:
      - Make sure the Issued To field displays the fully-qualified domain name of the Live Communications Server.
      - Make sure the Issued By field displays the name of the certificate authority that issued the certificate. This issuer should be either the same issuer, or an issuer in the same certificate chain, as described in Step 3c of Procedure 3a on page 37.
      - Make sure the expiration date is correct.

Procedure 2 - Installing a server certificate for the Live Communications Server

Follow the appropriate procedure for installing a server certificate for the Live Communications Server.

- If you are using a third party certificate authority other than Microsoft Certificate Services, refer to Installing a server certificate from another vendor on page 29.
- If you are using Microsoft Certificate Services, refer to Installing a Microsoft Certificate Services-based certificate on the Live Communications Server on page 30.

Installing a server certificate from another vendor

Steps 1 through 3 are provided as a general reference only -- follow the instructions on your CA's Web site.

1. From your browser, go your certificate authority's Web page for requesting a server certificate.
2. Complete the required fields for enrollment. Usually this includes contact information, such as your name, email address, your organizational unit (OU), and so on.

   When you are providing the name and IP address for the server, use this rule of thumb. If you are using Enterprise Edition, use the fully qualified domain name and IP address of your pool; if you are using Standard Edition use the fully qualified domain name and IP of your server.
3. Import the trusted certificate. For information about importing certificates and using the certreq utility, see "Using a Public Certificate," in *Microsoft Office Live Communications Server 2005 Certificate Configuration*.
4. Continue with the steps for Configuring the certificate for automatic routing on page 31.

Installing a Microsoft Certificate Services-based certificate on the Live Communications Server

From the Microsoft Live Communications Server, follow this procedure to install a server certificate issued by Microsoft Certificate Services.

Note:
In terms of the Microsoft Live Communications Server 2005 Certificate Configuration Guide, the AE Services TR/87 integration falls into the category of "interoperating with partner systems." This means that you must install a certificate that is configured for both client and server authorization, as depicted in Step 4c.

1. From your Web browser, type the URL of your certificate server. For example:

   http://<*certificate_server.*com>/certsrv

2. From the Microsoft Certificate Services Welcome page, click **Request a Certificate**.
3. From the Request a Certificate page, click **advanced certificate request**.
4. From the Advanced Certificate Request page, click **Create and submit a request to this CA**. Microsoft Certificate Services displays the next page of the of Advanced Certificate Request. Keep in mind that the fields presented on the Advanced Certificate Request pages depend on how the certification server is set up.

   Follow Step a through Step f to complete the Advanced Certificate Request.

   a. Under Identifying Information, in the Name field, type the fully qualified domain name (FQDN) of your pool. For example: **mylcspool.example.com** . The pool entry in the Name field applies to the Enterprise Edition of Live Communications Server. If you are using Standard Edition of Live Communications Server, you would use the FQDN of the server.

   b. Under Type of Certificate Needed, in the selection box, select **Other...** . When you select **Other**, the Certificate Request displays the OID field.

Note:
If you do not see a selection for **Other...**, it means you are using a CA other than Microsoft Windows Server 2003 Standalone Certificate Authority. See Client and server authentication on page 25

   c. In the OID field, type the following OID for your certificate: **1.3.6.1.5.5.7.3.1,1.3.6.1.5.5.7.3.2** (be sure to use a comma between the two parts of the OID). The first part of the OID, which is provided by default, (1.3.6.1.5.5.7.3.1) is for server authentication. The second part (1.3.6.1.5.5.7.3.2), which you must add, is for client authentication.

d. Under Key Options, make the following selections:

- In the Key Usage Field, select the option button for **Both**.
- In the CSP field, accept the default, which is **Microsoft Enhanced Cryptographic Provider v1.0**.
- Select the check box for **Store Certificate in the local computer certificate store**.

e. Under additional options, In the Friendly Name field, type a name that will help you identify the certificate.

f. Click **Submit**. Microsoft Certificate Services displays the Certificate Issued page.

5. From the Certificate Issued page, click **Install this certificate**. Microsoft Certificate Services displays the Certificate Installed page.

Configuring the certificate for automatic routing

Follow this procedure to configure the certificate for automatic routing among your pool and servers. For more information, see "Configuring Certificates for Automatic Routing Among Pools and Standard Edition Servers" in *Microsoft Office Live Communications Server Certificate Configuration*.

1. Open the Microsoft Office Live Communications Server 2005 management console.
2. In the left pane, expand the **Forest** node and the following subordinate nodes.
   - Live Communications servers and pools
   - ***lcspool node*** - the name of Live Communications Server pool node. If you are using Standard Edition, this refers to the Live Communications Server.
3. Under the lcs-pool node (**mylcspool**, for example), right-click the fully qualified domain name of your server (**mylcserver.example.com**, for example), and then click **Properties**.
4. From the ***mylcsserver.example.com*** **Properties** dialog, follow these steps to add a TLS certificate and a security certificate.
   a. Select the **General** tab. In the Connections box, select the listing for **Mutual TLS**.

      Choose either 1 or 2, based on what is appropriate for your situation.

      1. In the Connections box, select the listed **Mutual TLS** connection, and click **Edit**. From the **Select Certificate** dialog box, select the certificate that was issued to the pool name mylcspool.example.com, and click **OK**. Continue with Step 4b.
      2. Click **Add** to add a new connection so you can administer a certificate. From the Add Connection dialog box, select **TLS** for Transport Type and click **Select Certificate**. From the **Select Certificate** dialog box, select the certificate that was added to the pool name mylcspool.example.com, and click **OK**. Continue with Step 4b.

   b. Select the **Security tab**, and then click **Select Certificate**. From the Select Certificate dialog box, select the certificate you installed, and click **OK**.
5. From the Properties dialog, click **Apply**, and then click **OK** to close the Properties dialog.

Procedure 2a - Verifying the installation of the server certificate for Live Communications Server

Use this procedure to verify the installation of the server certificate, from any CA, for the Live Communications Server.

1. Start the Microsoft Management console -- Click **Start** and then click **Run**. In the Run dialog box, type **mmc**, and click **OK**.
2. From the Console window, click **File** > **Add/Remove Snap-in...**.
3. From the Add/Remove Snap-in dialog box, on the Standalone tab, which displays **Console Root** as the default, click **Add...**.
4. From the Add Standalone Snap-in dialog box, select **Certificates**, and click **Add**.
5. From the Certificates snap-in dialog box, select **Computer account**, and click **Next**.
6. From the Select Computer dialog box, select **Local Computer: (the computer this console is running on)**, and click **Finish**.
7. Click **Close** from the Add Standalone Snap-in dialog box, and then click **OK** from the Add/Remove Snap-in dialog box.
8. Verify that the server certificate for the Live Communications Server in installed, as follows:
   a. In the left pane of the console, Under Certificates (Local Computer) expand **Personal** and click **Certificate**. The console displays a list of certificates in the right pane.
   b. In the right pane of the console, verify that the display includes the server certificate that you installed at the end of Procedure 2, as follows:
      - Make sure the Issued To field displays the fully-qualified domain name of the Live Communications Server.
      - Make sure the Issued By field displays the name of the certificate authority that issued the certificate (referred to as the issuer on the certificate).
      - Make sure the expiration date is correct.

Procedure 3 - Installing the trusted certificate on the AE Server

The trusted certificate is also referred to as the certificate authority (CA) certificate. It is issued by the certificate authority, which can be either Microsoft Certificate Services or another certificate authority.

- If you are using a certificate authority other than Microsoft Certificate Services, use the procedure described in Generic procedure for installing the trusted certificate for AE Services on page 34.
- If you are using Microsoft Certificate Services, use the procedure described in Microsoft-based procedure for installing a trusted certificate chain on page 35.

Generic procedure for installing the trusted certificate for AE Services

These steps are provided as a general reference only -- follow the instructions on your CA's Web site.

1. From your browser, go to your certificate authority's Web page and download the certificate chain.

   Important:
   You must import the entire certificate chain all the way back to the root certificate.

   - The trusted certificate or certificate chain must be in text format (PEM or Base-64). If you are importing a certificate chain, it must be a text-based PKCS#7 file. Think of a PKCS#7 file as an envelope containing all trusted certificates.
   - It is acceptable to import certificates in the chain individually if they are not available in PKCS#7 format, but all certificates must be in the trusted certificates store.

2. The certificate authority processes your request and issues a trusted certificate (or certificate chain) for you to download.
3. Download the entire certificate to the AE Services administrative workstation, and save it with a unique name (for example, **C:\temp\aetrucert.cer**).
4. Using a text editor, copy the contents of the trusted certificate file, including the header and trailer.
   - The header and trailer for a PEM or Base 64 file are as follows:

     `----BEGIN CERTIFICATE-----` (header)

     `-----END CERTIFICATE-----` (trailer)
   - The header and trailer for a PKCS#7 file are as follows:

     `-----BEGIN PKCS7 -----` (header)

     `-----END PKCS7-----` (trailer)

   Note:
   The header and trailer in your PKCS#7 file must read as follows before you import the contents of the file into OAM.

   `-----BEGIN PKCS7-----`

   `-----END PKCS7-----`

   If the header and trailer read as `-----`BEGIN CERTIFICATE`-----` and `-----`END CERTIFCATE`-----` you must edit them to read as `-----`BEGIN PKCS7`-----` and `-----`END PKCS7`-----`.
5. Contact the Microsoft Live Communications Server administrator, and confirm that both the server certificate and the trusted certificate are installed and operating on Live Communications Server. The certificates must be installed and operating on Live Communications Server before you can carry out the procedures in AE Services OAM.
6. Continue with the steps described next in Importing the trusted certificate into OAM on page 36.

Microsoft-based procedure for installing a trusted certificate chain

If you use a Microsoft CA hierarchy, follow this procedure from the AE Server to import the trusted certificate chain in PKCS#7 format from Microsoft Certificate Services into AE Services OAM.

1. From Internet Explorer, type the URL of your certificate server. For example:

   http://<*microsoftcertificate_server.*com>/certsrv

2. From the Microsoft Certificate Services page, click **Download a CA certificate, certificate chain, or CRL**.
3. On the Download a CA Certificate, Certificate Chain, or CRL page, select the option button for **Base 64**, and click **Download CA certificate chain**.
4. Save the CA certificate file (the trusted certificate) to a local directory on the Microsoft Live Communications Server (for example **C:\temp\aetrucert.cer**).
5. Using a text editor, open the file and change the header and trailer, as follows:

Change the existing header and trailer	To this:
`-----BEGIN CERTIFICATE-----`	`-----BEGIN PKCS7-----`
`-----END CERTIFICATE-----`	`-----END PKCS7-----`

   Important:
   You must change the header and trailer in the PKCS#7 file as directed in Step 5 or you will not be able to successfully import the trusted certificate chain from a Microsoft CA.

6. Copy the entire contents of the CA certificate file, including the updated header and trailer.
7. Contact the Microsoft Live Communications Server administrator, and confirm that both the server certificate and the trusted certificate are installed and operating on the Live Communications Server. The certificates must be installed and operating on Live Communications Server before you can carry out the procedures in AE Services OAM.
8. Continue with the steps described next in Importing the trusted certificate into OAM on page 36.

Importing the trusted certificate into OAM

1. From AE Services OAM, select **CTI OAM Admin** > **Administration** > **Certificate Management** > **Trusted Certificate**.
2. From the Trusted Certificates page, click **Import**.
3. Complete the Trusted Certificate Import page, as follows:
   - In the Certificate Alias field, type an alias for the trusted certificate (for example, **catrusted**). The trusted certificate alias can be arbitrary. It does not need to match any aliases for AE Services.
   - In the Certificate PEM field, paste the contents of the CA's certificate file, and click **Apply**. If the import is successful, OAM displays the following message: "Certificate Imported Successfully."

Note:
At this point it is recommended that you complete Procedure 3a - Verifying the installation of the trusted certificate in AE Services on page 37.

Procedure 3a - Verifying the installation of the trusted certificate in AE Services

Use this procedure to verify the installation of the entire certificate chain (all the way back to the root certificate) in AE Services.

1. In AE Services OAM, select **CTI OAM Admin** > **Administration** > **Certificate Management** > **Trusted Certificate**.
2. From the Trusted Certificates page, select the alias of the trusted certificate (**catrusted**, based on this sample scenario), and click **View**.
3. From the Trusted Certificate Details page, verify that the information for the trusted certificate is correct.
   a. Verify that the entire chain of certificates exists, all the way back to a self-signed certificate.
   b. Verify that the Issued To field displays name of the organization that the trusted certificate is issued to.
   c. Verify that the Issued By field Indicates the name of the certificate authority that issued the trusted certificate (referred to as the issuer on the certificate). This issuer should be either the same issuer, or an issuer in the same certificate chain, as described in Step 8b of Procedure 1a on page 28.
   d. Verify that the Expiration Date Indicates the date that the trusted certificate expires.
   e. Verify the information in the Details display. Make sure the Certificate Status is valid.
4. Click **Close** to exit the Trusted Certificate Details page.

Converting Certificate files in other formats for AE Services

If your CA provides you with a certificate in a format other than PEM, you must convert it to PEM before importing it into AE Services OAM. The following sections describe how to convert files using openssl tools, which are available on the Web at www.openssl.org.

Converting a DER file to PEM : If your Certificate Authority provides you with a DER-encoded certificate, you must convert it to PEM before you can import it into AE Services OAM. Use the following command to convert the DER file to PEM format.

```
openssl x509 -in <input>.cer -inform DER -out <output>.cer -outform PEM
```

Converting a PKCS#12 file to PEM : If your CA provides you a certificate in PKCS#12 format you must convert it to PEM before importing it into AE Services OAM. Use the following command to convert the PKCS#12 file to PEM

```
openssl pkcs12 -clcerts -nokeys -in <cert.p12> -out <pathname>.pem
```

Procedure 4 - Creating a server certificate request for AE Services

In AE Services OAM, use this procedure to create a server certificate request (also referred to as a certificate signing request, or CSR) for the AE Services server. This procedure generates a certificate signing request which includes a private key.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Administration** > **Certificate Management** > **Server Certificate**.
3. On the Server Certificate page, Click **Add**.
4. Complete the Add Server Certificate page, as follows:
   - In the Certificate Alias field, type the alias (an arbitrary string of alphanumeric characters). For example: **aeservercert**.
   - Leave the Create Self-Signed Certificate check box unchecked (the default).
   - In the Encryption Algorithm field, select **3DES**.
   - In the Password field, type the password of your choice.
   - In the Key Size field, accept the default **1024**.
   - In the Certificate Validity field, accept the default, **1825**.
   - In the Distinguished Name field, type the LDAP entries required by your CA. These entries must be in LDAP format and they must match the values required by your CA. If you are not sure what the required entries are, contact your CA.

     Among the required entries will be the FQDN of the AE Server in LDAP format. Additionally you might need to provide your company name, your organization name and so on. Separate each LDAP entry with a comma, and do not use blank spaces, for example:

cn=myaeserver.example.com,ou=myOrganizationalUnit,o=examplecorp,L=Springfield,ST=Illinois,C=US

   - In the Challenge password field, type the challenge password of your choice.
   - Click **Apply**.

   AE Services displays the Server Certificate Manual Enrollment Request page, which displays the certificate alias and the certificate request itself in PEM (Privacy Enhanced Mail) format. The certificate request consists of all the text in the box, including the header `(-----BEGIN CERTIFICATE REQUEST -----)` and the trailer (`-----END CERTIFICATE REQUEST-----`).
5. Copy the entire contents of the server certificate, including the header and the trailer. Keep the contents available in the clipboard for the next procedure.

Procedure 5 - Creating a server certificate for AE Services

Use the appropriate procedure for creating a server certificate for AE Services.

- If you are using a third party certificate authority other than Microsoft Certificate Services, refer to Generic procedure for creating a server certificate for AE Services on page 40.
- If you are using Microsoft Certificate Services, refer to Microsoft-based procedure for creating a server certificate for AE Services on page 41.

Generic procedure for creating a server certificate for AE Services

These steps are provided as a general reference only -- follow the instructions on your CA's Web site.

1. From your browser, go your CA's Web page for requesting a server certificate.
2. Complete the required fields for enrollment. Usually you provide information such as your such as your name, email address, the IP address of your server, your organizational unit (OU), and the type of server you have.
3. Paste the CSR into the appropriate field and submit or upload the request. (You paste the certificate request that you copied in Step 5 of Procedure 4 on page 39).
4. The certificate authority processes your request and issues a server certificate for you to download.
5. Download the certificate to your AE Services administrative workstation, and save it with a unique name (for example, C:**aescert.cer**).

   Important:
   The certificate data you import into AE Services OAM system must be PEM-encoded (Base 64).

   – If your CA issues certificates in DER format, you must convert it to PEM before importing it into AE Services OAM. See Converting a DER file to PEM on page 38.

   – If your CA issues certificates in PKCS#12 format, you must convert it to PEM before importing it into AE Services OAM. See Converting a PKCS#12 file to PEM on page 38.

Microsoft-based procedure for creating a server certificate for AE Services

If you use Microsoft Certificate Services as the certificate authority, use this procedure as a guide for creating a server certificate for AE Services.

1. From your Web browser, type the URL of your certificate server. For example:

   http://<*certificate_server.*com>/certsrv

   where: <***certificate_server.com***> is the domain name or IP address of your certificate server.

2. On the Welcome page of Microsoft Certificate Services, click **Request a certificate**.
3. On the Request a Certificate page, click **advanced certificate request**.
4. On the Advanced Certificate Request page, click **Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64-encoded PKCS #7 file** . (AE Services uses a base-64-encoded CMC).
5. On the Submit a Request or Renewal Request page, paste the certificate request into the Saved Request input field, and click **Submit**. (You paste the certificate request that you copied in Step 5 of Procedure 4 on page 39).
6. From the Certificate Issued page, select **Base 64 encoded**, and click **Download certificate**.

   Note:
   Some CAs are not set up to automatically grant certificates. If this case, you might have to wait until your administrator issues the certificate. Once your administrator issues the certificate, return to the Welcome page of Microsoft Certificate Services, and click **View the status of a pending certificate request** to get to the "Issued Certificate" page.

7. From the File download dialog box, save the certificate to your computer.

Procedure 6 - Importing the server certificate into AE Services OAM

From AE Services OAM follow this procedure to import the AE Services server certificate into AE Services OAM. This procedure assumes that your certificate is in PEM format. If your certificate is in another format, see Converting Certificate files in other formats for AE Services on page 38.

Note:
Always install just the server certificate (as opposed to a PKCS7 certificate chain), but be sure to select **Establish Chain of Trust** as indicated in Step 6.

1. Using a text editor, open the certificate file you downloaded to your computer when you created a server certificate for AE Services.
2. Copy the contents of the certificate file, including the header (`-----BEGIN CERTIFICATE-----`) and the trailer (`-----END CERTIFICATE-----`).
3. In AE Services OAM, select **CTI OAM Admin** > **Administration** > **Certificate Management** > **Server Certificate** > **Pending Requests**.
4. From the Pending Server Certificates page, select the certificate alias you specified when you created the CSR for AE Services (based on the example, the alias is aeservercert). Then click **Manual Enroll**.
5. From the Server Certificate Manual Enrollment Request page, click **Import**. When you click **Import**, OAM displays the Server Request Import page.
6. Complete the Server Certificate Import page, as follows:
   - In the Alias field, type the alias you used to generate this certificate request (based on the example, it is **aeservercert**).
   - Accept the default for **Establish Chain of Trust** (by default it is selected).
   - In the Certificate PEM field, paste the contents of the certificate file that you copied in Step 2 of the current procedure.
   - Click **Apply**.

   If the import is successful, AE Services displays the message: "Certificate imported successfully."

Procedure 6a - Verifying the installation of the server certificate in AE Services

Follow this procedure to verify the installation of the server certificate in AE Services.

1. In AE Services OAM, select **CTI OAM Admin** > **Administration** > **Certificate Management** > **Server Certificate** .
2. From the Server Certificates page, select the alias of the server certificate (**aeservercert,** based on this sample scenario), and click **View**.
3. From the Server Certificate Details page, verify that the information for the server certificate is correct.
   a. Verify that the Issued To field displays the fully qualified domain name of the AE Server.
   b. Verify that the Issued By field Indicates fully-qualified domain name of the certificate authority that issued the server certificate.
   c. Verify that the Expiration Date Indicates the date that the server certificate expires.
   d. Verify the information in the Details window. Make sure the Certificate Status is valid.
4. Click Close to exit the Server Certificate Details page.

CAUTION:
AE Services allows only one server certificate at a time. If you install more than one server certificate and restart AE Services, the TR/87 service will fail to initialize.

Replacing an expired server certificate

Once a server certificate has expired, links or security features that rely on the validity of the certificate may fail. Because AE Services allows only one server certificate at a time, you must carefully manage the process of replacing an expired certificate.

If you have a certificate that is about to expire, you can install a new certificate without impacting AE Services. Before the server certificate expires, select the server certificate on the Server Certificate page and delete it. Once you have deleted the expired server certificate, restart the AE Server. When AE Services restarts the newly-installed certificate will go into effect.

Dial Plan settings in AE Services OAM

AE Services uses the information on the Dial Plan settings pages to process phone numbers used in your TR/87 implementation. In AE Services you can use either of the following methods to administer dial plan settings.

- You can administer the dial plan settings for one switch at a time. For more information, see Administering dial plan settings on a per-switch basis on page 49.
- You can administer default dial plan settings that are used for all switches. For more information, see Administering default dial plan settings on page 51.

Important:
In configurations with one AE Server supporting multiple switches, AE Services does not support Microsoft Office Communicator control of the same extension on more than one switch.

Before you begin

Before you start the procedures to administer dial plan settings, make sure you are familiar with Tel URI formats and the dial plan conversion pages in OAM. Tel URI is an abbreviation for Telephony Uniform Resource Identifier, sometimes it is expressed as "TelURI." OAM is an abbreviation for Operations, Administration and Maintenance.

- To familiarize yourself with Tel URI formats, see About Tel URI formats and device IDs on page 45.
- For information about using the OAM pages to create dial plan conversion rules for converting E.164 phone numbers to switch extensions and switch extensions to E.164 phone numbers, see About the From TelURI and To TelURI rules on page 46.

To complete the dial plan settings Web pages in AE Services OAM, you need to know how the dial plan is administered for on Communication Manager. If you do not know what the dial plan settings are for a particular switch or set of switches, contact the Communication Manager administrator.

About Tel URI formats and device IDs

Table 5 describes the supported Tel URI formats that AE Services supports. The preferred format is E.164, except in cases where the extension bears no resemblance to the E.164 number.

Calling device and monitored device ID: AE Services expects the calling device and monitored devices to be in either E.164PlusExt format or E.164 format. The extOnly format should be used only if there is no correlation between the E.164 number and the extension.

Called device ID: Called device IDs will not be in E.164PlusExt format, but they could be in any of the other formats listed in Table 5 .

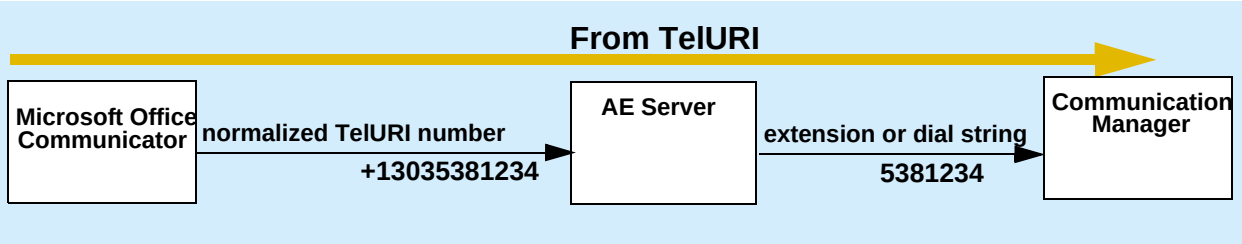
Table 5: Tel URI formats supported by AE Services

Format	Example
E.164	tel:+13035389000
E.164PlusExt	tel:+13035389000;ext=1234
extOnly	tel:5389000;phone-context=<domain> where <domain> can be any organization's domain name tel:5380112;phone-context=example.com

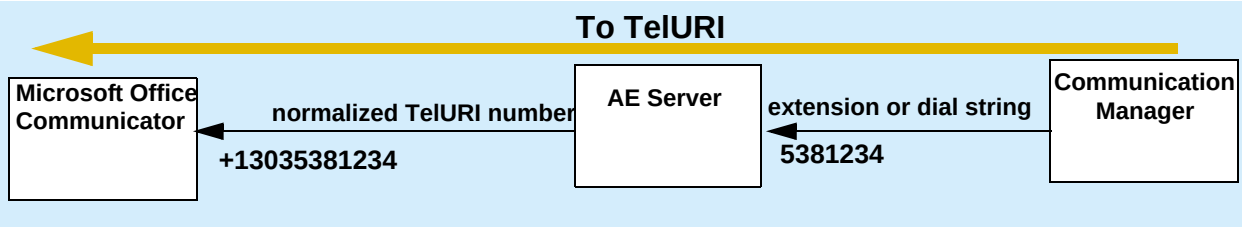
About the From TelURI and To TelURI rules

The dial plan conversion pages ("Dial Plan Settings - Conversion Rules for Default" and "Dial Plan Settings - Conversion Rules - switchname) in AE Services OAM are used for setting up conversion rules for a switch connection. The conversion rules are expressed as two tables in OAM, "From TelURI" and "To TelURI."

From TelURI: The term "From TelURI" is a shorthand way of saying "convert from a normalized TelURI number to an extension or dial string," which is handed off to the switch (Communication Manager).



To TelURI: The term "To TelURI" is a shorthand way of saying "convert from an extension or dial string to a normalized TelURI," which is handed off to Microsoft Office Communicator.



For a description of how these tables work, see

- From TelURI settings on page 47
- To TelURI settings on page 48

From TelURI settings

The **From TelURI** table in OAM determines the way that the AE Services TR/87 interface processes inbound E.164 numbers. Generally speaking, AE Services applies matching criteria to the incoming number. When the number satisfies the matching criteria, AE Services manipulates the digits and passes the number to Communication Manager (only one rule is applied for each number). When setting up the From TelURI settings, you can specify up to 200 rules. Each row in the table represents a rule. The rules are processed in order from top to bottom. If you have a rule that contains a wildcard (* - asterisk) for the Minimum Length, Maximum Length, and Pattern match, it always must be the last rule in the list.

Example - From TelURI rules

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	11	11	1303538	4	(blank character)
B	11	11	1732852	4	(blank character)
C	11	11	1720444	4	(blank character)
D	11	11	1303	1	9
E	11	11	1720	1	9
F	11	11	1	0	9
G	*	*	*	0	9011

Example of processing incoming numbers based on From TelURI rules in the example

A AE Services receives an 11-digit number, **13035381234**. Based on the matching pattern of **1303538** at the beginning, AE Services deletes the first 4 digits, **1303**, and sends **5381234** to the switch.

B AE Services receives an 11-digit number, **17328521234**. Based on the matching pattern of **1732852** at the beginning, AE Services deletes the first 4 digits, **1732**, and sends **8521234** to the switch.

C AE Services receives an 11-digit number, **17204441234**. Based on the matching pattern of **1720444** at the beginning, AE Services deletes the first 4 digits, **1720**, and sends **4441234** to the switch.

D AE Services receives an 11-digit number, **13036791234**. Based on the matching pattern of **1303** at the beginning, AE Services deletes the first digit, **1**, replaces it with a **9** and sends **93036791234** to the switch.

E AE Services receives an 11-digit number, **17202891234**. Based on the matching pattern of **1720** at the beginning, AE Services deletes the first digit, **1**, replaces it with a **9** and sends **97202891234** to the switch.

F AE Services receives an 11-digit number, **18183891234**. Based on the matching pattern of **1** at the beginning, AE Services prepends a **9** to the number and sends **918183891234** to the switch.

G AE Services receives a 13-digit number **4926892771234**. Based on a matching pattern of any digits, AE Services prepends **9011** to the number and sends **90114926892771234** to the switch.

To TelURI settings

The **To TelURI** table in OAM determines the way AE Services TR/87 interface processes outbound E.164 numbers. Generally speaking, AE Services applies matching criteria to the incoming number. When the number satisfies the matching criteria, AE Services manipulates the digits and passes the number to Microsoft Office Communicator (only one rule is applied for each number). When setting up the From TelURI settings, you can specify up to 200 rules. Each row in the table represents a rule. The rules are processed in order from top to bottom. If you have a rule that contains a wildcard (* - asterisk) for the Minimum Length, Maximum Length, and Pattern match, it always must be the last rule in the list.

Example - To URI rules

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	7	7	538	0	1303
B	7	7	852	0	1732
C	7	7	444	0	1720
D	5	5	2	0	173285
E	5	5	4	0	172044
F	10	10	*	0	1

Example of processing incoming numbers based on To TelURI rules in the example

A AE Services receives a 7-digit number from the switch, **5381234**. Based on the matching pattern of **538** at the beginning, AE Services prepends **1303** to the beginning and sends **13035381234** to the Microsoft Office Communicator.

B AE Services receives a 7-digit number, **8521234**. Based on the matching pattern of **852** at the beginning, AE Services prepends **1732** to the beginning and sends **17328521234** to the Microsoft Office Communicator.

C AE Services receives a 7-digit number, **4441234**. Based on the matching pattern of **444** at the beginning. AE Services prepends **1720** to the beginning and sends **17204441234** to the Microsoft Office Communicator.

D AE Services will sometimes receive a 5 digit extension from a networked switch, even if the local dial plan is 7 digits (see Dial Plan tips on page 49). In this case, AE Services receives a 5 digit number **21234**. Based on the matching pattern of **2** at the beginning. AE Services prepends **173285** to the beginning and sends **17328521234** to the Microsoft Office Communicator.

E AE Services will sometimes receive a 5 digit extension from a networked switch, even if the local dial plan is 7 digits (see Dial Plan tips on page 49). In this case, AE Services receives a 5 digit number **21234**. Based on the matching pattern of **4** at the beginning, AE Services prepends **172044** to the beginning and sends **17204441234** to the Microsoft Office Communicator.

F AE Services receives a 10-digit number, **2126711234**from the switch. Based on the matching pattern of any 10-digit string, AE Services prepends **1** to the beginning and sends **12126711234** to the Microsoft Office Communicator.

Dial Plan tips

When switches are networked together using ISDN QSIG tie trunks or ISDN tie trunks, in some call scenarios Communication Manager sends extension numbers from the networked switch to the AE Server. The format of these extension numbers may be different than the format of local extension numbers.

To optimize the experience of Microsoft Office Communicator users, be sure to administer "To TelURI" rules for the networked switch, or switches, as well as the local switch. Additionally, if the networked switch has a different extension length than the local switch, extensions might be reported with both the local extension length and the networked extension length. Be sure to administer "To TelURI" rules that can successfully convert both extension lengths for the networked switch.

Also, you might need multiple entries in the "To TelURI" rules for the networked switch if that switch has a different extension length than the local switch.

Administering dial plan settings on a per-switch basis

Follow this procedure to administer the dial plan settings for a switch connection you have already administered in AE Services (CTI OAM > Administration > Switch Connections). AE Services uses the dial plan information to convert E.164 phone numbers to switch extensions (From TelURI) and switch extensions to E.164 phone numbers (To TelURI). For more information, see About the From TelURI and To TelURI rules on page 46.

Note:
If your TR/87 Implementation uses a number of switches that all have the same dial plan, use the procedure described in Administering default dial plan settings on page 51. By using the default settings, you enter the dial plan settings only once.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Administration** > **TR87 Configuration** > **Dial Plan** > **Switch Administration**.
3. From the Switch Dial Plan Administration page, select the connection name for the switch you want to administer, for example **aeslcswitch**, and click **Details**.

   AE Services OAM displays the Dial Plan Settings - Conversion Rules for aeslcswitch page. This OAM page provides you with a way to Add, Edit, Delete and Reorder "From TelURI" conversion rules and "To TelURI" conversion rules. The Edit, Delete, and Reorder functions apply to existing rules. This example assumes the initial state of the page -- no conversion rules exist -- and focuses on adding two conversion rules, one for From TelURI and one for To TelURI.

4. Follow Step a to add a From TelURI conversion rule, and follow Step b to add a To TelURI conversion rule.

   a. In the From TelURI section of the page, under the blank display area, click **Add**.

      1. From the Add Dial Plan to aeslcswitch page, complete the fields for the **From TelURI** settings, based on your dial plan.

      2. Click **Apply Changes**. OAM displays the Add Dial Plan page, which asks you to confirm your dial plan changes. From the Add Dial Plan page, click **Apply**.

         At this point you have added one From TelURI conversion rule. If you want to add another From TelURI conversion rule, you must repeat Steps a, 1, and 2.

   b. In the To TelURI section of the page, under the blank display area, click **Add**.

      1. From the Add Dial Plan to aeslcswitch page, complete the fields for the To TelURI settings, based on your dial plan.

      2. Click **Apply Changes**. OAM displays the Add Dial Plan page, which asks you to confirm your dial plan changes. From the Add Dial Plan page, click **Apply**.

         At this point you have added one To TelURI conversion rule. If you want to add another To TelURI conversion rule, you must repeat Steps b, 1, and 2.

   At this point the changes you made to your dial plan settings are in effect, and you do not have to restart the AE Server.

Administering default dial plan settings

If you use more than one switch in your TR/87 implementation, and all the switches have common dial plan settings, you can use the Default Dial Settings page as a template. When you add a switch connection for TR/87, the dial plan settings that you have administered on the Default Dial Plan settings page are applied to that switch connection. Use this procedure to set up the Default Dial Settings page.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Administration** > **TR87 Configuration** > **Dial Plan** > **Default Settings**.

   AE Services OAM displays the Dial Plan Settings - Conversion Rules for default page. This OAM page provides you with a way to Add, Edit, Delete and Reorder "From TelURI" conversion rules and "To TelURI" conversion rules. The Edit, Delete, and Reorder functions apply to existing rules. This example assumes the initial state of the page -- no conversion rules exist -- and focuses on adding two conversion rules, one for From TelURI and one for To TelURI.
3. Follow Step a to add a From TelURI conversion rule, and follow Step b to add a To TelURI conversion rule.
   a. In the From TelURI section of the page, under the blank display area, click **Add**.
      1. From the Add Dial Plan to default page, complete the fields for the From TelURI settings, based on your dial plan.
      2. Click **Apply Changes**. OAM displays the Add Dial Plan page, which asks you to confirm your dial plan changes." From the Add Dial Plan page, click **Apply**.

         At this point you have added one From TelURI conversion rule. If you want to add another From TelURI conversion rule, you must repeat Steps a, 1, and 2.
   b. In the To TelURI section of the page, under the blank display area, click **Add**.
      1. From the Add Dial Plan to default page, complete the fields for the To TelURI settings, based on your dial plan.
      2. Click **Apply Changes**. OAM displays the Add Dial Plan page, which asks you to confirm your dial plan changes. From the Add Dial Plan page, click **Apply**.

         At this point you have added one To TelURI conversion rule. If you want to add another To TelURI conversion rule, you must repeat Steps b, 1, and 2.

   At this point the changes you made to your dial plan settings are in effect, you do not have to restart the AE Server.

Administering Active Directory

Follow this procedure to set up the connection to Active Directory for AE Services.

- The examples in this procedure use the "example.com" domain name.
- See also, DN entries and scope of search on page 53 for a diagram depicting Distinguished Names.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Administration** > **TR 87 Configuration** > **Active Directory**.
3. Complete the Active Directory Configuration page, as follows.
   - User DN for Query Authentication - Type the DN for the user object that AE Services uses for accessing the Active directory. Based on how users are set up in Active Directory, the user object could correspond to a Full Name, a Display Name, or a User logon name. Here are two examples:

     cn=Grey\\,Al,cn=sertech,cn=services,cn=users,dn=example,dc=com

     cn=RTCAdmin,cn=devtech,cn=services,cn=development,dc=example,dc=com

   Note:
   If a DN attribute has a comma within it, you must precede it with a backslash. For more information, see AE Services OAM Usage tips on page 54. If you are not sure what the DN is for a user object, see Determining the DN for a user object on page 54.

   - Password - Type a password to be used for Active Directory access; retype the same password in the Confirm Password field. This Active Directory password is stored in an encrypted format on the AE Server.
   - Base Search DN -The Base Search DN is less specific than the User DN. Type the DN of the node that includes all user accounts that need access to the AE Services and Live Communications Server integration in the following format:

     cn=users,dc=example,dc=com

   - IP Address - Type the IP address or Host Name of the Domain Controller that runs Active Directory.
   - Port - (used for Active Directory access) - Change the default port number to an appropriate value for your configuration. The default is 389 (the port assignment for LDAP).
   - Select **Apply Changes** to put your changes into effect.

DN entries and scope of search

The DN entries you specify in the User DN for Query Authentication and the Base Search DN field are, in effect, search paths in an LDAP structure.

Consider the DN examples used in Administering Active Directory on page 52:

- User DN for Query Authentication

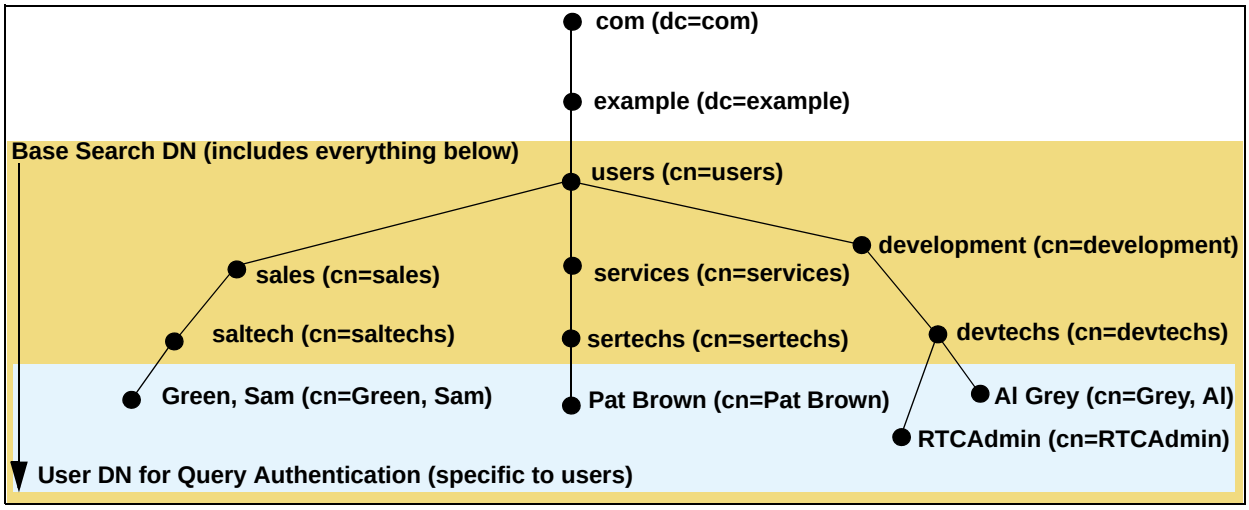
  cn=Pat Brown,cn=sertech,cn=services,cn=users,dc=example,dc=com

- Base Search DN

  cn=users,dc=example,dc=com

Both DNs are unique, but the User DN for Query Authentication is more specific than the Base Search DN. To get a sense of the difference between the two DNs see Figure 4.

Figure 4: DN entries and scope of search



AE Services OAM Usage tips

Here are a few usage tips based on Figure 4.

- If you were to specify a Base Search DN of **cn=development,cn=users,dc=example,dc=com** the users in services and sales would not be able to establish a session. Instead, you should specify a Base Search DN that is less specific, such as **cn=users,dc=example,dc=com** .
- The cn=attributes at the user level (Green, Sam; Pat Brown, and Grey, Al) are all valid, but notice that the cn= attributes "Green, Sam" and "Grey, Al" contain a comma within the attribute. When you enter these DNs in AE Services OAM, you must precede the internal comma with two backslashes. This is necessary because the comma is a delimiter that is used for separating DN attributes. For example:

  cn=Green\\,Sam,cn=saltech,cn=sales,cn=users,dc=example,dc=com

  cn=Grey\\,Al,cn=devtech,cn=development,cn=users,dc=example,dc=com

Determining the DN for a user object

If you are not sure what the DN for the user object is, follow this procedure from the Active Directory Services domain controller.

1. At the command prompt, run the **`csvde -f`** command against the Users domain and save the output to a file (**`csvde -f file.csv`**).
2. Open the file with a text editor or a spreadsheet program and locate the appropriate user object (which can be the Full Name, Display Name, or User logon name on the Active Directory User Properties dialog).
3. Copy the DN for the user object, and paste it into User DN for Query Authentication field in OAM.

About configuring Live Communications Server for AE Services

To set up the Live Communications Server, follow the procedures listed in the section called "Configuring the Server" (a subsection of "Deploying Telephony") in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*. The procedures that require adding AE Services specific information are as follows:

- Enabling Remote Call Control (RCC) extensions in Active Directory -- which refers to per-user, manual administration. For more information see Enabling Remote Call Control in Active Directory on page 56.

  Tip:
  Microsoft provides a utility called **Office Communicator 2005 Phone Normalization Script** that enables you to make bulk changes to Active Directory. If you run this utility, you do not have to do per-user manual administration. To get this phone normalization script, go to **www.microsoft.com**, and locate **Live Communications Server 2005 with SP1 Resource Kit**. The resource kit includes this phone normalization script.

- Setting up a static route -- for more information see Configuring a static route on page 57.

Enabling Remote Call Control in Active Directory

In the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*, refer to the procedure called "To enable RCC extensions in Active Directory for users." Follow Steps 1 through 3 as directed, and complete Step 4 by following this procedure:

1. Click the option button for TEL URI, and type the appropriate telephone number in Tel URI format. For example: **tel:+13035389000**.

   Note:

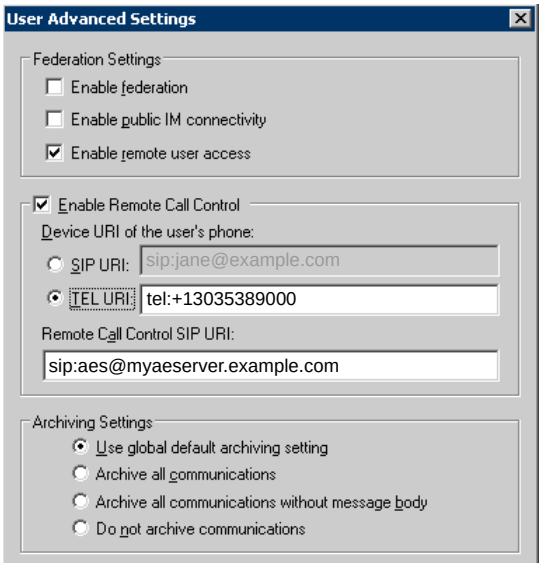
   If necessary, you can use the following format : **tel:*E.164 phone number*;ext=*extension*** (for example, **tel:+13035389000;ext=9000**)

   In most cases, the extension (**ext=*extension***) is not required. It is required only under these circumstances:

   - If the user's extension does not match the last ***x*** digits of their E.164 Direct Inward Dial (DID) number.
   - If the dial plan information has not been configured for the user's switch.

2. In the Remote Call Control SIP URI field, type the destination URI in the following format: **sip:aes@*AE_server_FQDN***

   where: **aes** is the identifier for the AE Server and ***AE_server_FQDN*** is a term you substitute with the fully qualified domain name of your AE Server. For example: **sip:aes@myaeserver.example.com**



- Continue with the remaining steps in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide.*

Note:

In terms of the Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide, the AE Server performs the role of the RCC Gateway only. The SIP/PSTN Gateway and the PBX-SIP Proxy do not apply to AE Services TR/87 configurations.

Microsoft Office Communicator users - group policy settings

Microsoft Office Communicator users must have the following features configured as policy settings:

- Enable Computer to Phone Calls
- Enable Phone Control

For information about group policy settings, see "Group Policy Configuration (.adm)," in *Microsoft Office Communicator 2005 Planning and Deployment*.

Configuring a static route

Handling SIP traffic from the Live Communications Server to AE Services requires creating a static route between the Live Communications Server (or servers) and the AE Services server. This procedure is based on a configuration using Live Communications Server 2005 Enterprise Edition.

Follow this procedure to configure a static route between the Live Communications Server and the AE Services Server.

1. Open the Microsoft Office Live Communications Server 2005 management console, and in the left pane, expand the **Forest** node.
2. Right-click **Live Communications servers and pools**, and select **Properties**. (For Enterprise Edition **Live Communications servers and pools** represents the pool node; for Standard Edition, it represents the server node.)
3. From the Properties dialog box, select the **Routing** tab, and click **Add**.
4. Complete the fields on the Add Static Route dialog box as follows:
    a. In the User field, type **aes**.
    b. in the Domain field, type the fully qualified domain name of the AE Server (for example, **myaeserver.example.com**).
    c. In the Network address field, type the fully qualified domain name of the AE Server (for example, **myaeserver.example.com**).
    d. In the Transport field, select **TLS**.
    e. In the Port field, type the port that was administered as the **TR87 Port** in AE Services OAM**.** The default is **4723**.
    f. Click **OK**.

For more information about setting up static routes, see "To create static routes" in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*.

Specifying the AE Server as an authorized host

Follow this procedure to set up AE Services as an authorized host. This procedure is based on a configuration using Live Communications Server 2005 Enterprise Edition.

1. Open the Microsoft Office Live Communications Server 2005 management console, and in the left pane, expand the **Forest** node.
2. Right-click **Live Communications servers and pools** (the pool node), and select **Properties**.
3. From the Properties dialog box, select the **Host Authorization** tab, and click **Add**.
4. Complete the fields on the Add Authorized Host dialog box as follows:
   a. In Network address field, type the fully qualified domain name of the AE Server (for example, **myaeserver.example.com**).
   b. Select the check boxes (enable) for the following settings: **Throttle as server** and **Treat As Authenticated**. Make sure that **Outbound only** is not checked (disabled).
   c. Click **OK**.

For more information about setting up host authorization, refer to the figure called "Edit Authorized Host" in the *Microsoft Office Communicator 2005 Telephony Planning and Deployment Guide*.

About authentication and authorization

For the TR/87 integration, authentication and authorization are handed as follows.

- AE Services authenticates Live Communications Server by using TLS to verify the Live Communications Server certificate.
- The Live Communications Server authenticates (confirms the identify) of the Microsoft Office Communicator user.
- The AE Server, in turn, authorizes (grants permission to) the user for device control.
- To carry out authorization, AE Services verifies that the requested Tel URI matches the Tel URI in the user record before granting access to a device.

Note:
When you complete the procedure to enable the Communicator client for RCC, (Enabling Remote Call Control in Active Directory on page 56) you are provisioning Active Directory with the user information that AE Services queries for.

Using the TR/87 Test features

Follow these steps to use TR/87 test features in AE Services OAM.

1. From the browser on your AE Services administrative workstation, log in to AE Services OAM.
2. Select **CTI OAM Admin** > **Utilities** > **TR/87 Test**.
3. From the TR/87 Self Test page, select from the following tests:

- **TR/87 Transport** -- use TR/87 Transport to verify that the installed certificate can be used to establish a SIP session on the loopback interface. This does not verify the far-end server certificate.
- **TR/87 Service** -- use TR/87 Service to verify the following
  - the caller is administered in Active Directory
  - the dial plan is administered for the caller's number
  - the user's telephone device can be monitored
- **TR/87 Makecall** -- use TR/87 Makecall to verify that phone control is active for the user.

Recovering from a system outage

When AE Services returns to an operational state after an outage, you will be able to use Microsoft Office Communicator (Communicator) to place and control new calls. If you experience an outage, bear the following in mind:

- If you were on a call when an AE Services outage occurred, complete the call and manually hang up the phone so that your phone and Communicator are synchronized. When you are ready to start a new call in Communicator, your phone and Communicator will be synchronized.
- If Communicator signs you out as result of a network outage, you must sign in to Communicator again before you can control new calls. If you attempt to sign in during an AE Services outage, Communicator displays the warning icon along with the pop-up indicating that Communicator can not make phone calls.

Known issues

This section describes a few feature-related issues, as follows:

- Using the Call Forwarding or Send All Calls features on page 60
- Using the Do Not Disturb feature on page 61
- Putting the active call on hold before starting a new call on page 61
- Clear Connection request on a held connection is not supported on page 61
- Bridging irregularities on page 62
- Missed Call e-mail on page 62

Additionally, this section addresses the general issue that under certain conditions a party's telephone number will not be available to Microsoft Office Communicator. When this is the case, Microsoft Office Communicator can not display a telephone number or party identifier.

- Unidentified caller in Microsoft Office Communicator window on page 62
- Communicator displays numbers with trunk notation on page 63

Using the Call Forwarding or Send All Calls features

From the Microsoft Office Communicator, you can use Call Forwarding and Send All Calls as follows:

- You can set your phone to forward calls.
- You can set the Microsoft Office Communicator to forward calls relative to the client you are signed in to.
- You can set your phone to "Do Not Disturb" mode, which refers to Send All Calls (SAC) in AE Services.

CAUTION:
Keep in mind, however, that you should not press the Forwarding or the Send All Calls (SAC) buttons on a physical phone set. Pressing these buttons can cause the Microsoft Office Communicator to lose synchronization with the phone.

Using the Do Not Disturb feature

For Do Not Disturb (DND) to function properly, you must administer a coverage path on the station, in Communication Manager. When you complete the Coverage path screen in Communication Manager, make sure that you enable **DND/SAC/Go to Cover** for inside calls and outside calls -- the settings for **Inside Call** and **Outside Call** should be **y**.

For information about administering a coverage path in Communication Manager, see "Creating coverage paths" in *Administrator Guide for Avaya Communication Manager,* 03-300509.

Setting up forwarding off-switch

If you experience problems setting up forwarding off-switch (to your home or cell phone, for example) you should contact the Communication Manager administrator. There are certain settings in Communication Manager that could prevent your ability to set up forwarding off-switch.

Putting the active call on hold before starting a new call

It is not possible to start a new call through Microsoft Office Communicator while there is already an active call. You must put the active call on hold before starting a new call.

Clear Connection request on a held connection is not supported

Communication Manager does not support a Clear Connection request on a held connection For the Microsoft Office Communicator user, this means that if you have a held call and you press the red, "stop" button on the call windows, you will get an error message and the call will remain in the held state.

Bridging irregularities

In an AE Services and Live Communications Server environment, the Microsoft Office Communicator might not behave as expected if you use bridged call appearances. Here are some examples of irregularities associated with bridged calls.

- If a user answers on a bridged extension, Microsoft Office Communicator continues to alert on the primary extension and eventually times out.
  - This bridging irregularity occurs when you administer EC500 phones with XMOBILE. If you administer EC500 phones with OPTIM, the bridging irregularities do not occur. For more information see, “Considerations for Extension to Cellular” in *Feature Description and Implementation for Avaya Communication Manager*, 555-245-205. OPTIM refers to Off-PBX Telephone Integration and Mobility.
- If you call someone whom has a bridged extension, the Microsoft Office Communicator conversation window might display either of the following:
  - an additional party on the call representing that bridged extension.
  - "Unidentified Caller"

Missed Call e-mail

Missed Call e-mail is sent only if the caller hangs up before the call goes to call coverage (voice mail).

Unidentified caller in Microsoft Office Communicator window

For the following reasons you might see "Unidentified Caller" in the Microsoft Office Communicator conversation window:

- The user you have called has a bridged extension.
- Your call went to a voice mail system. If your call is answered by a voice mail system, the voice mail system itself appears as an "Unidentified Caller."
- Your call went to Music-on Hold by way of a Voice Announcement with LAN (VAL) board on Communication Manager, causing you to lose phone control on your Microsoft Office Communicator. You can resolve this issue by upgrading Communication Manager with Service Pack 12866.
- You manually entered a number in the FIND box that was not in the proper format.

  If you are manually typing the number in the FIND box, be sure to enter the full phone number, including the country code and either the area code or the region code, whichever is appropriate. Depending on how the system has been administered, it might be acceptable to not include the country code in the entered number. In all cases, the Automatic Route Selection (ARS) code for the outside line (9, for example) should not be included.

Communicator displays numbers with trunk notation

Microsoft Office Communicator displays telephone numbers as trunk identifiers instead of telephone numbers in both transfer and conference scenarios. Trunk identifiers are numbers that are displayed in the following form: **T5237#2**.

- In some transfer scenarios, Microsoft Office Communicator displays a trunk identifier instead of a calling or called party.
- In some conference scenarios, Microsoft Office Communicator displays a trunk identifier as an extra party on the call.

Contact the Communication Manager administrator

In either type of scenario, the presence of trunk group identifiers might be the result of improperly administered trunk groups in Communication Manager. If Microsoft Office Communicator displays a trunk identifier, contact the Communication Manager administrator.

The Communication Manager administrator should verify that ISDN trunks are properly administered (Trunk Group screen). The settings for "Send Calling Number" and "Send Connected Number" should be set to **y**. Administering ISDN trunks also requires administration of the "Numbering - Public/Unknown Format" screens. For more information, see *Administrator Guide for Avaya Communication Manager*, 03-300509. ISDN is the acronym for Integrated Services Digital Network.

Note:

When "QSIG Value-Added" is enabled for QSIG trunks, the label for "Send Connected Number" changes to "Send Called/Busy/Connected Number".

Appendix A: SIP requests and associated errors

SIP INVITE request (start application session)	
Code	**Description**
200	OK
401	Unauthorized: Session could not be established - invalid AD search parameters
404	Not found: Session could not be established - no AD record for this user
408	Request timeout:Session could not be established - AD request timed out
480	Temporarily unavailable: Session could not be established - unable to connect to AD Server
486	Busy Here: AE Services is temporarily overloaded.
500	Internal server error: Session could not be established.

Appendix B: AE Services TR/87 call flow

This appendix provides a basic message flow description and two illustrations that show the interaction between Microsoft components and Avaya components in an Application Enablement Services (AE Services) TR/87 implementation.

Message flow

The message flow diagram in Figure 5 shows the flow of messages from application startup (Microsoft Office Communicator) to a successful MakeCall operation and associated Originated event (AE Services and Communication Manager).

- Steps 1 and 2 show some initial provisioning between the application, Microsoft Active Directory Services, and Live Communications Server.
- Steps 3 through 10 show the establishment of the SIP dialog.
  - The Communicator client sends a SIP INVITE containing a Request System Status message.
  - When Live Communications Server receives this message, it opens a TLS connection to AE Services. AE Services will be provisioned with the certificate of the Live Communications Server server so that Live Communications Server will be a trusted server on the TR/87 port.
  - After the TLS connection has been established, Live Communications Server forwards the INVITE message on to AE Services. At this point, the AE Services Device, Media, and Call Control service will extract the user identity from the SIP message and query Microsoft Active Directory Services to find the extension(s) that the given user can control. This will be used for authorization of all subsequent requests.
  - It will then send a SIP OK message with a System Status message indicating everything is operational.
- Steps 11 through 14 show the Communicator client requesting the set of supported CSTA features. This is because not all telephony systems support all of the services that Communicator uses.
- Steps 15 through 18 show the Communicator client establishing a monitor for Pat's station.
- Steps 19 through 22 show a Make Call request from Communicator being sent through to AE Services. For more details on what happens when this request is received, refer to Figure 5.

- Steps 23 through 26 show an Originated event coming from AE Services and being delivered to the Communicator client. This would have started with a CSTA 1 event from TSAPI to Call Control Services. CCS would then map this to the appropriate Call Control Listener, convert the event to CSTA 3, and invoke the proper method on the listener. This would result in the event being sent to the SIP UA and out to the Live Communications Server and eventually to the Communicator Client.

Figure 5: Call flow scenario -- MakeCall and an associated Originated Event

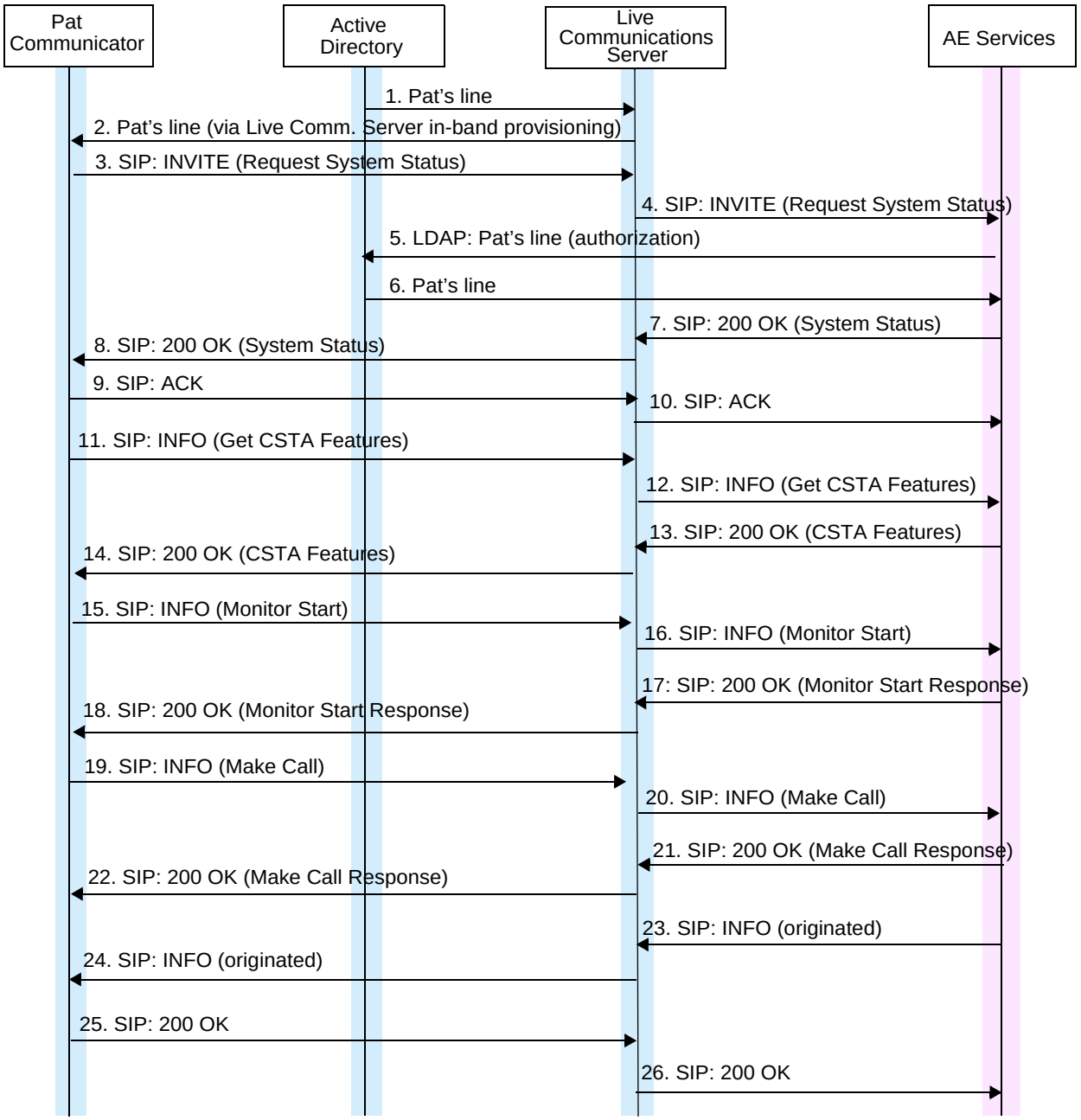
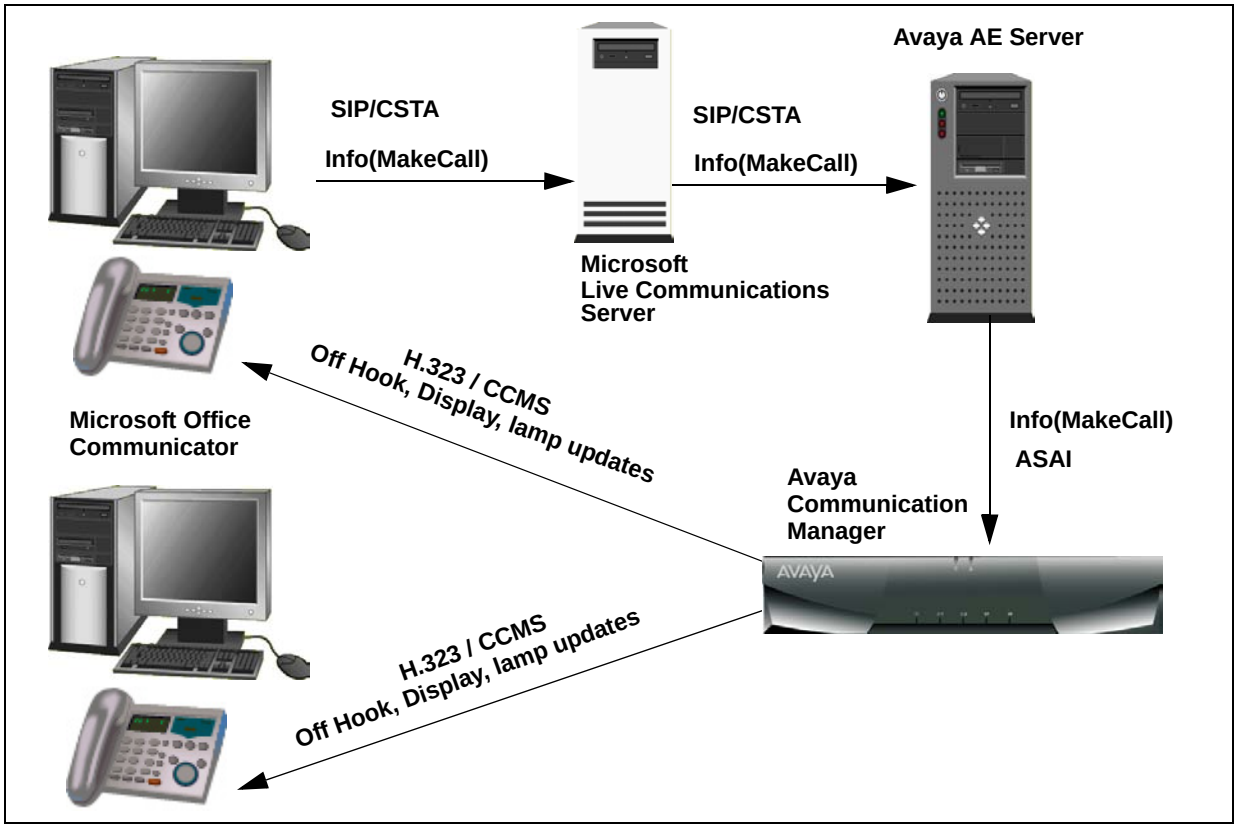

Pat Communicator
Active Directory
Live Communications Server
AE Services
1. Pat's line
2. Pat's line (via Live Comm. Server in-band provisioning)
3. SIP: INVITE (Request System Status)
4. SIP: INVITE (Request System Status)
5. LDAP: Pat's line (authorization)
6. Pat's line
7. SIP: 200 OK (System Status)
8. SIP: 200 OK (System Status)
9. SIP: ACK
10. SIP: ACK
11. SIP: INFO (Get CSTA Features)
12. SIP: INFO (Get CSTA Features)
13. SIP: 200 OK (CSTA Features)
14. SIP: 200 OK (CSTA Features)
15. SIP: INFO (Monitor Start)
16. SIP: INFO (Monitor Start)
17: SIP: 200 OK (Monitor Start Response)
18. SIP: 200 OK (Monitor Start Response)
19. SIP: INFO (Make Call)
20. SIP: INFO (Make Call)
21. SIP: 200 OK (Make Call Response)
22. SIP: 200 OK (Make Call Response)
23. SIP: INFO (originated)
24. SIP: INFO (originated)
25. SIP: 200 OK
26. SIP: 200 OK

Figure 6 illustrates the TR/87 Message flow for the Make Call operation in terms of a basic connectivity diagram. Other requests would follow a similar pattern.

Figure 6: AE Services TR/87 Call flow



Appendix C: Capacities

Communication Manager Domain Control Capacity Increase

The number of supported domain controls on Communication Manager 4.0 is 32,000. This increase applies only to the S87-series servers and the S8500 server. If Communication Manager is used for call center or other call control functionality, care must be taken to not exceed the total number of domain controls.

AE Services Associations

The number of supported generic associations on the AE Services Server (AE Server) is 32,768.

Busy Hour Call Completion (BHCC)

For the AE Services TR/87 Implementation, the BHCC rate, in terms of Live Communications Server traffic, is 17,000 calls per hour. This rate is based on counting a Make Call request and an Answer Call request as separate calls on the AE Server. One Microsoft Office Communicator client user calling another Microsoft Office Communicator client user would therefore count as two calls in the BHCC measurements.

Maximum Users

The AE Services server supports a maximum of 5,000 concurrent users. If you plan to support more than 5,000 concurrent Microsoft Office Communicator clients you must use more that one AE Services server. For more information, see Figure 3: Configuring AE Services with 5,000 or more concurrent users on page 11.

Throughput

The AE Server supports six TR/87 (CSTA 3) messages per second, per 1000 users.

License Consumption

A license is consumed for the entire duration of time that Microsoft Office Communicator is signed in with Live Communications Server.

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